THE IRON AGE

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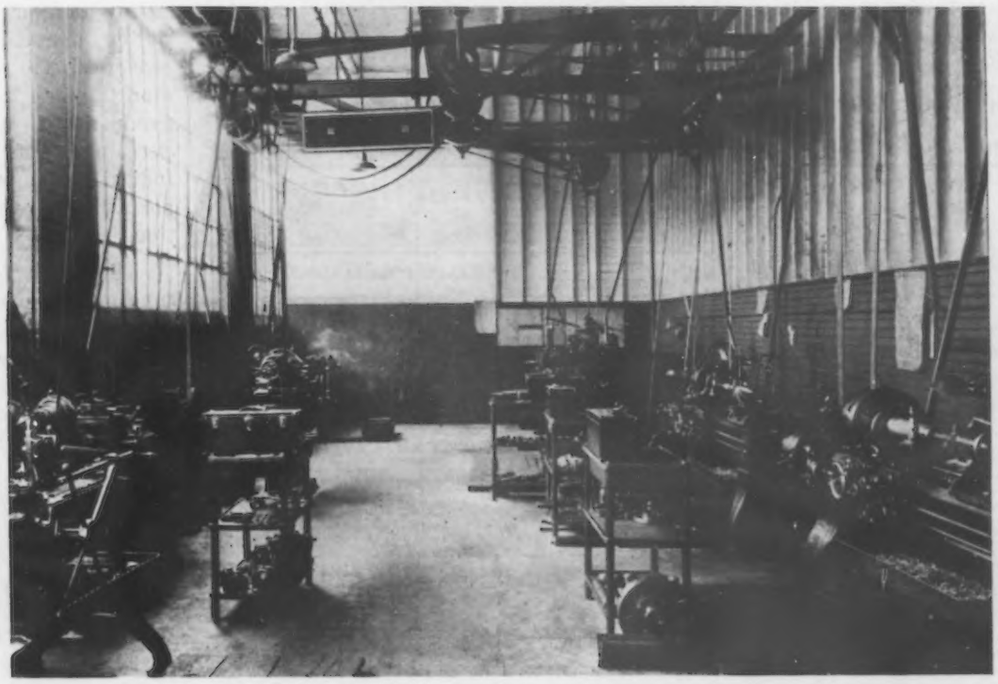
Detailed Records and System of Grading Used to Rate Apprentice's Work

THE Cooper-Bessemer Corpn., Mount Vernon, Ohio, has a successfully conducted apprentice training school. Monthly records and a system of grading are used in establishing efficiency ratings for apprentices and from the data obtained charts are prepared that form a permanent record of the standing of each student.

Boys to be admitted to the apprentice training school must be 18 years of age, physically fit, mechanically inclined and of good character. Boys with high school training, or at least with a knowledge of mathematics are preferred. When accepted, they go on probation for a month before being regularly enrolled as students. Under the direction of the school instructor they are given a preliminary training in the operation of various types of machine tools in the apprentice department, which is separate from the production department and is fitted up with the various types of machines used in the plant. Here boys are tested for their aptitude for machine work and are given training preparing them for the production shop.

Class room work is given by the instructor on Saturday morning and the apprentices are allowed regular wages for that time. Lessons used are supplied by the Pennsylvania State College. Membership in the class is limited at present to about 20, being kept low so that the boys can be permanently retained,

In a department set aside from the main shop the apprentice is given his preliminary training on different types of machine tools



since it is contrary to company policy to lay off apprentices during periods of depression.

The apprentice course requires 7200 hr., or about three years' time in the shop and class room. Overtime is credited to the apprentice in calculating his hours of service and time absent is deducted. The entire apprentice period is divided into nine wage adjustment periods of 800 hr. each. The boys start at 24c. an hour and are given a 2c. increase at the beginning of each succeeding period, receiving during the final period 40c. an hour. In addition the company deposits in the bank $3 a month for each apprentice. These instalments, which bear 3 per cent interest, are in sufficient number to amount to a lump sum of $100 at the completion of apprenticeship. No part of this amount is given the apprentice until he completes his training course. The purpose of this additional reward is to impress on the boys the advantage of saving. At the same time it may have a tendency to hold a boy, should he develop an inclination to leave the school. The company also pays for the boy's college text course and supplies him with a tool box containing the tools required in his work. The total pay received by the boy during his three-year training is $2,304.

Apprentices are frequently transferred from one machine to another with a view of giving them all about an equal number of hours on each machine, so that each will have a complete training in the operation of each of the ten types of standard machines used in the plant.

To show his efficiency in shop work and the class room, a complete record of each apprentice is kept during his training course, after his month of probation. This starts with a monthly apprentice record made out by the instructor (chart A), which includes the boy's shop record, school record and a record of the hours he spent during each day on each type of machine. His shop record covers conduct, interest, aptitude, confidence, accuracy, speed, neatness and days absent and times tardy. A system of grading is provided by the use of a grade index or scale (chart B), and an apprentice is graded by letters according to the average mark that has been given him for accuracy, speed, conduct, etc. Grading for speed is made from the apprentice's time cards, which are based on the same time studies that are used in the production department. To get a 100 per cent speed rating an apprentice must do an operation in the standard time set by time study. Each item on the grade chart is given a percentage of the total, indicating the relative importance of each qualification.

There are five grades ranging from *S* or "superior," indicating a 100 per cent record down to *P*, or "poor," which shows a 60 per cent average rating. The school record is also tabulated on the monthly apprentice record and indicates the apprentice's grade for neatness, interest and speed in class room work. On one-half of the same chart the number of hours

MONTHLY APPRENTICE RECORD

NAME OF APPRENTICE _____ REPORT OF ____ 19__

DATE	SHOP RECORD: DAYS ABSENT	DAYS TARDY	CONDUCT	INTEREST	APTITUDE	CONFIDENCE	ACCURACY	SPEED	NEATNESS	SCHOOL RECORD: LESSON WORKING ON	GRADE ON LAST LESSON	NEATNESS	INTEREST	SPEED
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11										REMARKS-				SIGNED
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13														
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28														
29														
30														
31														
GRADE														

CHART A

APPRENTICE GRADE INDEX

S = SUPERIOR = 100%

AA = ABOVE AVERAGE = 90% BA = BELOW AVERAGE = 70%

A = AVERAGE = 80% P = POOR = 60%

GRADE	SUPERIOR		ABOVE AVERAGE		AVERAGE		BELOW AVERAGE		POOR	
	S	%	AA	%	A	%	BA	%	P	%
CONDUCT	EXCEPTIONAL	10.25	VERY GENTEEL	9.75	WELL BEHAVED	9.25	TROUBLESOME	8.25	UNSATISFACTORY	7.75
INTEREST	ENTHUSIASTIC	11.75	VERY INTERESTED	10.75	INTERESTED	9.75	LACKS INTEREST	7.75	DISINTERESTED	6.75
APTITUDE	VERY QUICK TO LEARN	16.25	APT	13.75	LEARNS READILY	11.25	SLOW TO LEARN	6.25	DENSE	3.75
CONFIDENCE	EXCELLENT	11.75	SELF-RELIANT	10.75	CONFIDENT	9.75	LACKS CONFIDENCE	7.75	TIMID	6.75
ACCURACY	EXCEPTIONALLY ACCURATE	14.75	ACCURATE	12.75	AVERAGE	10.75	INACCURATE	6.75	CARELESS	4.75
SPEED	VERY RAPID	11.75	RAPID	10.75	AVERAGE	9.75	SLOW	7.75	VERY SLOW	6.75
NEATNESS	UNUSUALLY NEAT	13.25	VERY NEAT	11.75	NEAT	10.25	UNTIDY	7.25	CARELESS	5.75
ATTENDANCE	EXCELLENT	10.25	VERY GOOD	9.75	GOOD	9.25	FAIR	8.25	POOR	7.75
TOTAL	S	100%	AA	90%	A	80%	BA	70%	P	60%

CHART B

MONTHLY APPRENTICE SHOP RECORD

NAME OF APPRENTICE _____ REPORT OF ____ 19__

DATE	HOURS SERVED ON DIFFERENT MACHINE TOOLS															
	DRILL PRESS	MILLING MACHINE	GRINDER	SHAPER	LIGHT LATHE	HEAVY LATHE	TURRET LATHE	SPEED LATHE	GISHOLT LATHE	WARNER AND SWASEY	BENCH	ERECTING FLOOR	DRAFTING	INSPECTION
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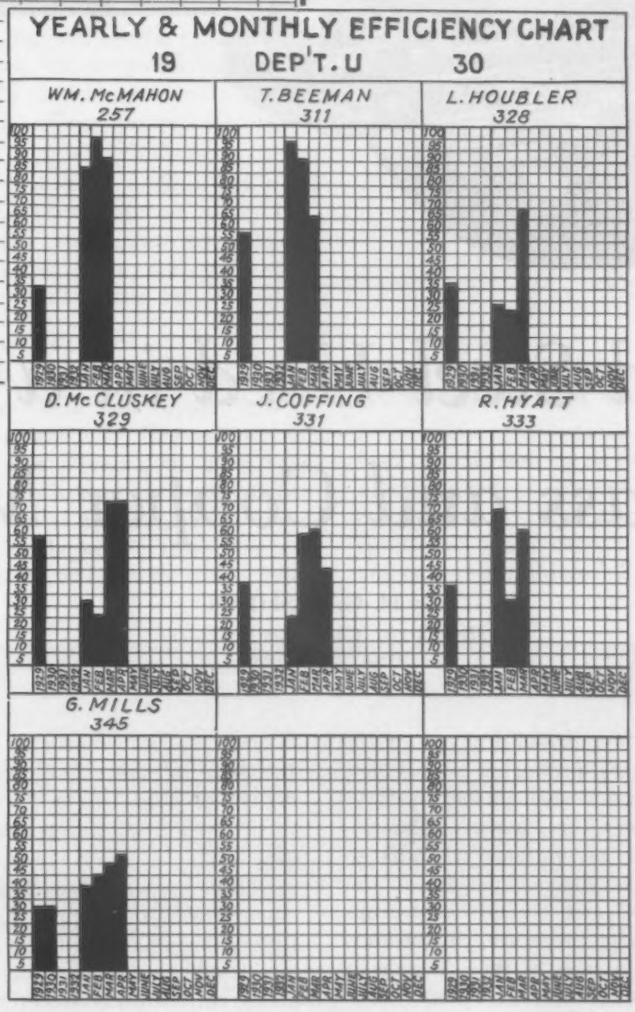

CHART C

CHARTS A; B and C. These forms are used for keeping records of the apprentices, as referred to in the text.

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an apprentice served on different machines is listed for each day of the month. For ready reference the apprentice's monthly record is transferred to a permanent record, which shows a boy's standing almost at a glance. Another chart (chart C) shows each apprentice's grade for each month and for the previous full year.

Electric Cleaning of Blast Furnace Gas

THE influence exercised by the physical and chemical composition of blast furnace gas and dust on the electric cleaning process is the subject of an article by Alfred Michel in a recent issue of *Stahl und Eisen*. According to an abstract in the London *Iron and Coal Trades Review*, the investigations on which the writer's results are based were carried out at the electric blast furnace cleaning plant of the Elga type at the Mannesmann Tube Works, Huckingen, Germany. The author presents a curve showing the working, as plotted, which revealed what the moisture content of the gas had to be in relation to its temperature on entering the purifying chamber in order to secure the best possible result. The maximum temperature limit for the electric removal of dust from blast furnace gas to a purity of 0.02 grams per cubic meter was found to be 80 deg. C. and to a purity of 0.1 grams, 110 deg. C. The most favorable range of temperature for cleaning is stated to be from 50 to 70 deg. C.

In regard to higher gas temperatures, the writer points out the necessity of a far-reaching pre-cooling treatment. The power consumption per 1000 cubic meters of dried gas over 0.35 kwhr. and 0.55 kwhr., including the pre-treatment of the gas. The writer therefore contends that the economic superiority of the electric purifying process has been fully demonstrated.

Expenditures for Research

EXPENDITURE for research by rolling mills and steel plants of the United States is 0.04 per cent of the capital invested, according to Dr. Frank Parker, professor of finance in the Wharton School of Finance and Commerce, Philadelphia. The average for all industries for which data are available is 1.03 per cent. The figure for chemical and allied products, spending the most, is 2.04 per cent.

In an address before the American Institute of Steel Construction, Pinehurst, N. C., Oct. 28, Dr. Parker urged the extension of research programs to cover production, marketing and distribution as well as the technical, and he said plans should be laid in terms of ten-year periods, as such are calculated "to obviate the needless changes in tonnage and profits."

Quoting the most recent compilation of the National Research Council, he pointed out that all industries have an average annual research expenditure per plant of approximately $50,000, and that rolling mills and steel plants spend $16,200.

A Chase brass and copper mill at Waterbury, Conn., nearly a mile long. Various shapes of extruded brass rods (Insert)

Iron and Steel Used in a Modern Brass and Copper Mill

By H. G. KESHIAN
Metallurgist, Chase Companies, Inc.
Waterbury, Conn.

BRASS and copper mills, representing one of the oldest groups of metal-producing industries, have always used iron and steel in the construction of their equipment. Therefore, much of the mechanical improvement which the engineer was able to introduce into these mills has often depended on the development of iron and steel of better physical properties. It would be interesting, therefore, to consider, in a general way, some of the uses of these metals in this pioneer industry for its various operations.

In the Casting Shop

IN the melting of brass and copper, whether in the crucible or in the modern electric induction furnace, the molten metal has to be stirred and the dross must be skimmed off before pouring. For this purpose bars of wrought iron and sticks of graphite of suitable size were used. Wrought iron not being fragile like graphite was much preferred; but it always presented a danger of contaminating the metal by going into solution with it, which required extreme caution on the part of the melter.

Low-carbon high-chromium iron has now been found to be far superior to wrought iron in this respect, reducing the danger of contamination to a minimum. But there is still a need for a material which, besides being resistant to the corrosive action of brass and copper, will not become unduly brittle by repeated use.

There are very few things in the casting shop of a modern brass and copper mill which the melter so carefully guards as the correct casting temperature of his metal. On account of the interfering fumes of the metal, an optical pyrometer cannot be used to advantage, and a pyrometer with its fire end immersed in the molten metal must be used. Pyrometer protecting tubes made of high-chromium iron, when used intermittently, will be found satisfactory. But for prolonged use, that is, where it is desired to leave the fire end of the instrument in the furnace indefinitely, no satisfactory unfragile material for protecting tubes has been found yet.

For mold material, the brass and copper melter uses the gray iron ingot molds, and some of his problems connected with these molds are identical with those of his brother melter in the steel mill. Unquestionably in the future, material changes will take place both in the design and in the manufacture of

present gray iron molds and probably new mold metals, with services commensurate with their cost, will be developed.

In the Rolling Mill

FOR scalping, overhauling and milling cast and rolled bars and ingots, high-speed steel seems to hold its favored position by virtue of its combining in itself a good wearing property with ability to retain its hardness at these relatively low frictional temperatures where other types of steels lose their hardness.

In the rolling of copper and brass the progressive manufacturer has been alert to the advantage of not only better methods of rolling, as understood today, but also to the quick adoption of better materials for various rolling mill operations and equipment. In some instances, of course, the rate with which he has been able to adopt better material for different equipment, such as rolls, gears, pinions, shafts, chains, etc., has necessarily depended on the progressiveness and readiness of the rolling mill machinery manufacturers to substitute better material or new processes to their product.

Competition here also has been playing its role, beneficial to all concerned. Thus cast iron gears and pinions are being gradually supplanted by cast or forged steel and heat-treated ones, and soft steel shafts are being replaced by alloy steel ones.

Steel Versus Iron Rolls

Use of steel rolls for breaking down and finishing operations in the modern brass and copper mill is slowly but steadily gaining ground. Where the final cost, or the ultimate economic value, of steel rolls over that of chilled iron rolls has been established beyond doubt, their adoption, as a whole, has not been slow. At present, undoubtedly better steel rolls are being made and the rate with which they will be used will quite logically depend on their relative cost and ability to prove their economic value over the chilled iron rolls.

For cold shearing or slitting sheet brass and copper, no standard type of steel as to chemical composition is to be found. Among the types that are used may be mentioned plain carbon tool steels, carbon-tungsten and carbon-chromium. Freedom from loading up with

WHAT is required today, but also what may be needed tomorrow, in the way of ferrous products for brass and copper mills, is the burden of the accompanying article, which adds materially to a literature of marked paucity. The high spots:

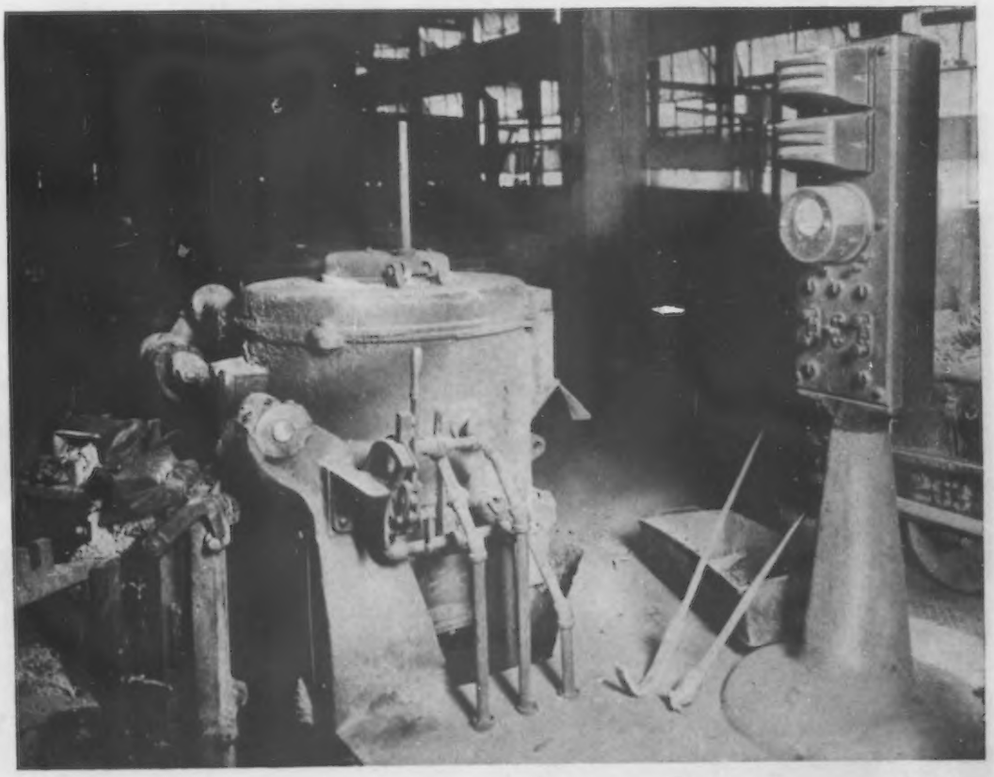
In the Foundry: **Rustless steel and gray iron ingot molds.**

In the Rolling Mill: **Steel rolls replacing chilled iron rolls, plain carbon and alloy tool steels for shearing, alloy steel for cold drawing equipment, such as chains, dies, etc.**

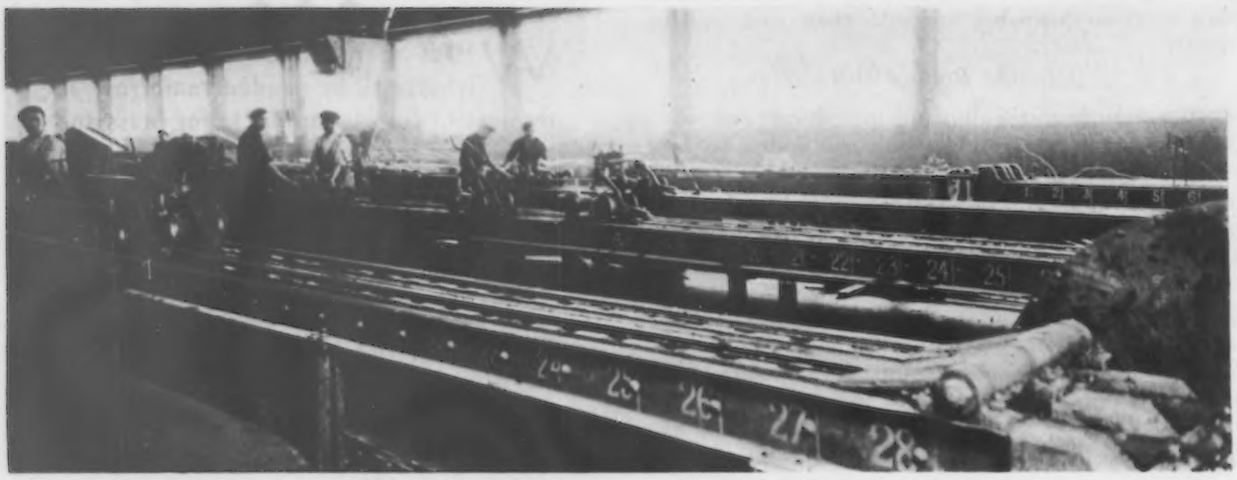
Hot Working: **Four types of alloy steels used, heat treated.**

Hot Piercing and Forging: **Several kinds of steels in use.**

Extrusion Die Steels: **High and low tungsten high-speed types generally used.**



ONE of over 60 induction-type electric furnaces for melting brass and copper, equipped with control instruments. High-chromium iron skimming bars used for skimming off the dross in foreground



COLD drawing brass and copper. For cold drawing, iron and steel are used in many different forms

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the metal and absence of quick wearing and chipping are the essential requirements for these cutters, which requirements are generally controlled by the microscopic structure, the hardness and the finish which the slitters receive during the process of their manufacture.

Heat-Treated Alloy Chains Now Used

For cold drawing equipment for tubes, rods, and shapes of various designs, iron and steel are used in different forms, such as draw bench frames, chains, carriages, dies, plugs, arbors, etc. Heat-treated alloy steel chains made of either chromium-nickel, chromium-vanadium or pearlitic manganese steels, are definitely proving their superiority over the old-time medium carbon steel chains, often used in natural condition.

A draw bench chain, crude as it may seem, constitutes one of the vital parts of cold drawing equipment of a metal working plant and the manufacturers of this type of machinery have an excellent opportunity to bring this equipment to its highest efficiency by applying our latest knowledge on the development of physical properties of metals, with a definite knowledge of the proper limits for breaking strength, yield point and elongation which the chain should possess under known conditions of operation. On the other hand the user can best cooperate with the manufacturer by putting before him his own needs by definite-

DRAWING of large brass and copper tubes on powerful hydraulic presses. Another property, which often is the determining factor in the choice of steel for drawing dies, is the readiness with which the steel can be shrunk back to size after the die hole has become too large

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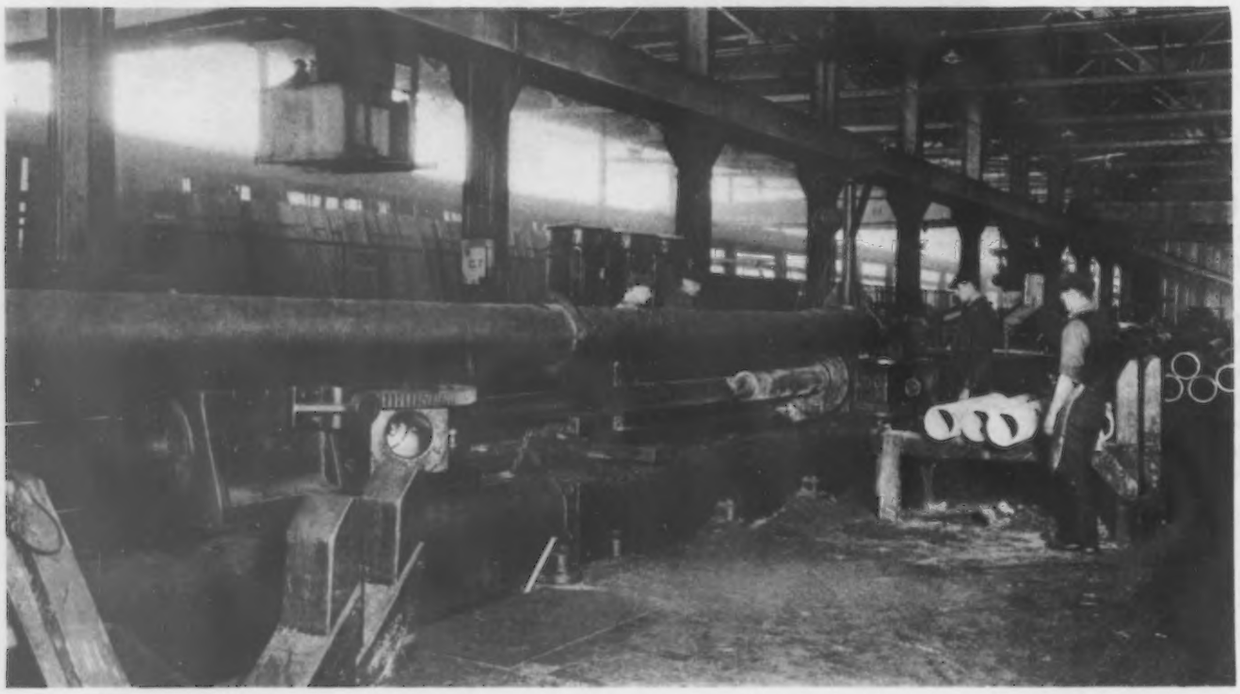


ly specifying the maximum pulling capacity required of the chain without yield or elongation with a given factor of safety.

For draw bench grip jaws, properly heat-treated plain carbon or alloy steels may be used. As these members are subject to shock as well as to a steady straight pull a composition having maximum toughness with reasonable hardness should be selected.

Steels Best Suited to Cold Draw Brass

Regarding the characteristics of steel that would be best suited to cold draw copper and brass, there is a perfect understanding between the steel maker and the user, namely, that the steel must have maximum wearing properties without tendency to scratch the work. Now, the chemical composition of steel which will fulfill these requirements does not seem to be so clear. Some prefer 1 per cent plain carbon steel, others from 1.10 to 1.20 per cent carbon steel and still others some alloy steel mostly of the tungsten type. But experience shows that even 0.80 to 0.90 per cent carbon steel will make a good drawing die. Among the many different types of alloy steels recommended or used for drawing dies are, carbon-vanadium, carbon-chromium, both high-carbon high-chromium and low-chromium and high-carbon, carbon-tungsten steels.

Another property, which often is the determining factor in the choice of steel for drawing dies, is the readiness with which the steel can be shrunk back to size after the die hole has become too large. Some of the alloy steels do not shrink and many of them shrink but slightly, making it necessary to either reforge the die back to size or make new dies; and the schedule of operations for various draws does not always permit the use of smaller dies by reworking them to dies of larger holes.

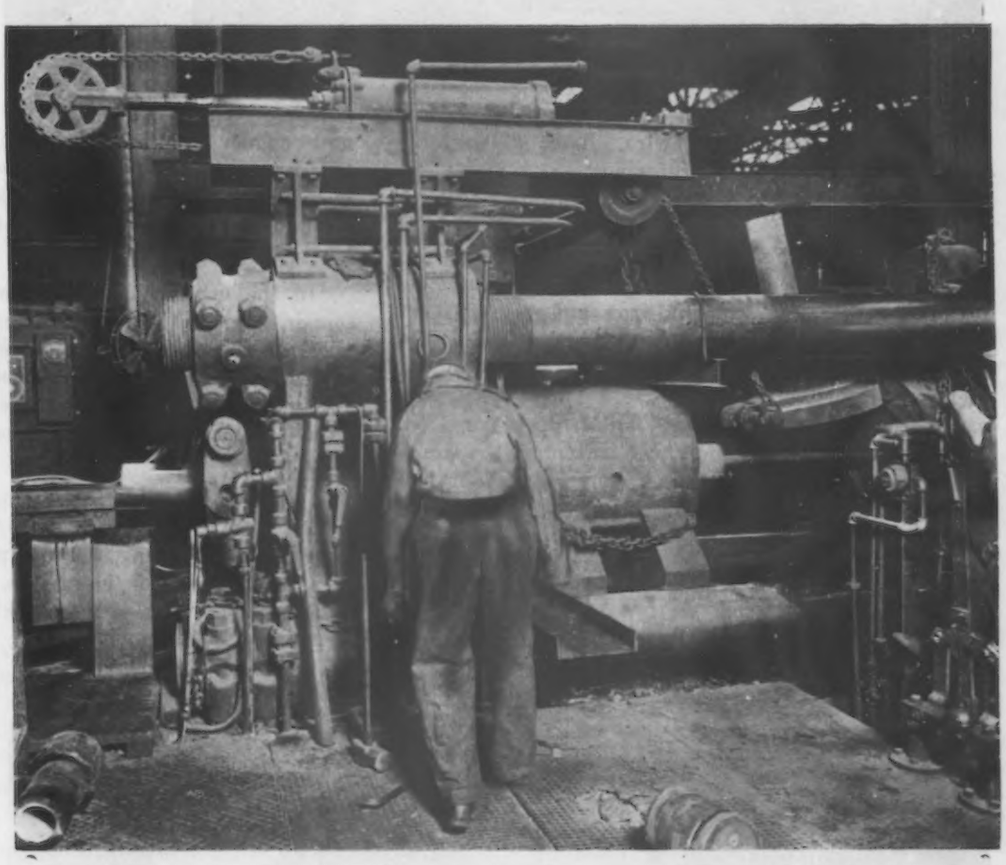
This limited degree of shrinkability of alloy steels is a disadvantage against them when they are used for drawing dies and by no means can be overlooked. Under certain conditions, however, it will be decidedly better to use alloy steel dies, particularly for finishing operations.

Difficult to Select Steels for Drawing Dies

The choice of proper steel for drawing dies becomes even more difficult when other factors besides the chemical composition of the steel are to be considered. For instance, as is well known, steels made by two different mills, even though of identical analysis, do not always have the same quality, soundness, the same satisfactory microscopic and macroscopic structure, the same degree of responsiveness to heat treatment, etc.

For drawing brass and copper wire, chilled iron, tungsten carbide, diamond and hardened, and soft steel dies are used. Soft steel dies—usually those of alloy steels—are freer from heat checks and can be peened back to size or reforged to size. Hardened steel dies are better suited for finishing operations because they can maintain their size for a much longer period than the soft dies.

Generally speaking, alloy steels having from 1.25 to 1.35 per cent carbon, from 4 to 5 per cent tungsten, or 2 per cent carbon and 5 per cent chromium, or 2 per cent carbon and 12 per cent chromium give satisfactory service for larger sizes of wire and wire



EXTRUDING brass rod at the Chase plant in Waterbury. Extruding presses are capable of exerting 80,000 lb. pressure per sq. in. Into the large alloy steel container (right) a hot brass billet is being inserted. At the right of the operator is the die through which the billet has just been pushed out

INSPECTION of finished brass and copper tubing. The chief desirable characteristic of the steel for drawing dies is maximum wearing property without tendency to scratch the work

rod. For relatively small wire, diamond, tungsten carbide or wortle steel is preferred.

Steels for Hot Working

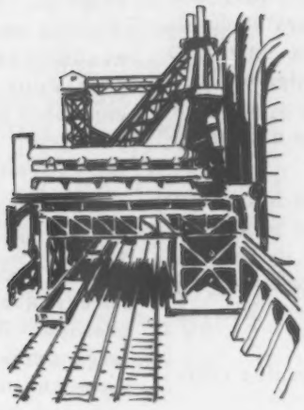
IN the hot working of brass and copper the types of steel used are not expected to fill a more strict demand than for hot working iron and steel, except perhaps the operation of hot extruding brass and copper. Excluding the latter, the stresses in the rolling, piercing or forging to shape, are not as a whole any greater than those for the similar operations for iron and steel. Furthermore, the maximum hot working temperature for brass and copper is about 500 deg. Fahr. lower than for iron and steel. But, as contrasted to this, there is this fact that, generally, the hot forged brass and copper parts are such that they require more exacting dimensions and finish than those required of iron and steel parts. This means that the dies must hold their size and shape closer and be freer from heat checks to a greater extent than the dies used for iron and steel forged parts. Obviously, for operations of this nature, a hot working steel, of the best type in respect to these requirements, has to be used.

In the other type of hot working of brass and copper, namely, the process of extrusion, the pressure may run as high as 80,000 lb. per sq. in., requiring a steel the essential characteristic of which must be maximum resistance to compression or deformation at billet temperatures varying from 1300 to 1800 deg. Fahr.

In addition to these requirements that are expected of the steel to be used for hot working brass and copper, be it forging, rolling, piercing or extrusion, there are other considerations, some of which, although not peculiar to hot working brass and copper,

(*Continued on page* 1359)

SHEARING the brass and copper. For cold shearing and slitting sheet brass and copper, no standard type of steel as to chemical composition is to be found



Blast Furnace Gas as a Metallurgical Fuel

By JOSEPH F. SHADGEN

FUEL problems offer the greatest field for improvements in modern steel plants. Combustion in its broad aspects will demand greater attention and more concentrated effort to reduce costs to lower figures. Production problems will yield first place to questions of costs and quality.

Modern plant economies demand that the term "by-product" be wiped out. It is necessary to create overall maximum efficiency, that *all* products of every metallurgical process be considered on an even basis as contributing values.

For instance, blast furnaces not only produce cast iron, but they yield three major products: Cast iron, slag and blast furnace gas, which have to be valued at their highest rating. It is true that the blast furnace is primarily an ore-reduction furnace, but this is possible only by making it a gigantic gas producer as well.

While pig iron has a ready value, so has the slag. Ever-increasing markets have been opened to this material—long considered a waste and a burden. Crushed slag is used as railroad ballast, as road-making material, and as raw product for bricks and artificial stones. Blast furnace slag can be used to advantage as raw material in Portland cement kilns, and for insulating, mineral wools, etc. To develop these manifold industrial applications successfully, commercial vision was necessary, with the tenacity to overcome the technical difficulties pertaining to the adaptations to each specific use.

Importance of Blast Furnace Gas

Blast furnace gas is the third product of the process of reducing ore into pig iron. Its importance is undeniable; its volume is enormously large, although its unit heat value is low. Roughly 50 to 55 per cent of the heat content of the coke charged with the ore leaves the furnaces in the form of gas.

It is safe to say that the production of every ton of pig iron yields also 130,000 to 140,000 cu. ft. of gas which, at 90 B.t.u. per cu. ft., makes some 11.75 to 12.5 million B.t.u. This is equivalent to 800 or 900 lb. of high-grade bituminous coal and permits generation of 700 to 800 kw.-hr. Typical analysis of the gas by volume and its major properties are:

Per Cent		
CO = 25.4	} Combustibles, 28.9 per cent.	
H_2 = 3.5		
N_2 = 58.6	} Inerts, 71.1 per cent.	
CO_2 = 12.5		

Higher heat content, 93.5 B.t.u.
Lower heat content, 91.8 B.t.u.
Density = 1.05.
One volume gas needs 0.68 volume air, and with 10 per cent practical excess, 0.75 volume of air, for combustion.
Heat content of unit gas and air mixture is 52.5 B.t.u.

Advantageous utilization of this large fuel value in gaseous form demands not only cleaning but thorough cleaning, to permit reliable and safe, easy and economical, distribution. The past 20 years of development of the art has demonstrated not only that cleaning pays its way but that it makes higher-grade uses possible. Hence cleaning extends the application of the blast furnace gas and increases the unit value of the gas.

Methods of cleaning blast furnace gas have been developed to a high degree; the cleansing process is progressive, removal of the coarse dirt in settling chambers and the fine in the secondary processes. All principles have been applied, wet and dry, filtering bags, centrifugal, electrical.

It is today universally accepted that cleaning costs are recovered by increased value of gas.

Major uses of blast furnace gas are:

1. Stoves.
2. Boilers (power production).
3. Metallurgical furnaces and processes.

Stoves being a necessary adjunct of the blast furnace, their quota comes first. Modern stoves require from 25 to 30 per cent of the gas produced, or some 32,000 to 42,000 cu. ft. per ton of pig iron. This is equivalent to 2,900,000 to 3,800,000 B.t.u. While it may be argued by the old-time operators that stove efficiencies have not been materially increased by gas cleaning, it cannot be denied that clean gas made modern stove design possible, with logical brick design, less brick weight, greater surface and fewer stove units. This means less capital tied up and less maintenance in operation. Less than 3,000,000 B.t.u. for air preheating requires clean gas and modern stoves.

Huge Surplus of Gas for Outside Uses

Hence, the surplus of blast furnace gas available for other applications than the ore-reduction process itself is about 65 to 70 per cent, meaning roughly 95,000 to 100,000 cu. ft. per ton of pig iron, and equivalent to some 8.5 to 9.5 million B.t.u. This enormous surplus of gas should be used to yield maximum returns. Returns mean dollars, but not necessarily process efficiency. Local conditions must be duly appreciated and considered to determine actual values. Developments should be based on the guidance furnished by the technical aspects of the diverse applications possible.

To present some interesting realities in a critical form is attempted herewith:

To date most of the surplus gas has been burnt under boilers to generate steam for electrical power production. As boiler fuel the gas is in competition with coal. No advantage as to process efficiency is possible. Hence blast furnace gas has a low value only, if substituted for coal as boiler fuel.

Ninety-five thousand to 100,000 cu. ft. of gas is equivalent to 625 to 685 lb. of coal (13,000 B.t.u.). The best values figure between 1c. and 2c. per 1000 cu. ft. of blast furnace gas.

This means that the surplus blast furnace gas available per ton of pig iron has a value of $1 to $2. This value checks the fact that 500 kwhr. can be generated per ton of steel. Based on 0.3c. (3 mills) per kwhr., this represents $1.50, the mean between the extreme values given.

(1 kwhr. = 16,000 to 17,000 B.t.u.)
(550 × 16,500 = 9,075,000 B.t.u. total)

The reasons for this low value of the blast furnace gas are the nature of the steam-generating process. Blast furnace gas is too lean, requires large combustion chambers, has low flame temperatures and needs large induced draft fans, large motors and high power consumption. Efficiencies of burning blast furnace gas under boilers seldom exceed 80 to 82 per cent in modern plants, while coal efficiency averages 82 to 85 per cent under parallel conditions.

Hence boilers offer only a "*handy*" solution, not an economical one. Handy, because any surplus may be dumped into the power house and absorbed on short notice. Hence boilers must be equipped for both gaseous and solid fuels (lately, combination pulverized fuels and gas have become very popular).

Metallurgical Fuels

Most metallurgical processes require a clean fuel not contaminated with impurities (ashes), of which sulphur is the most objectionable. This limits solid fuel (coals) and makes gasification processes necessary to make sulphurless fuels available. That caused the invention of gas producers, water-gas sets, etc., to produce gaseous fuels better suited than the solid coals for a multitude of applications where heat is necessary in steel plants.

Producer gas is made by partly decarbonizing coal, with CO and the main constituents very similar to blast furnace gas, but somewhat richer in B.t.u. content. Its characteristics follow:

	Per Cent	
CO	20.5	Combustibles, 36 per cent
H_2	12.5	
CH_4	3.0	
CO_2	7.5	Inerts, 64 per cent
N_2	56.5	

Higher heat content, 147.8 B.t.u.
Lower heat content, 138.7 B.t.u.
Density = 0.9.
One volume of gas needs 1.1 volumes of air, or with 10 per cent practical excess air, 1.25 volumes. Heat content of gas and air mixture, 66.5 B.t.u., about 25 to 30 per cent richer than blast furnace gas-air mixture.

Producer gas is the standard metallurgical fuel used in coke ovens, open-hearth furnaces, soaking pits, heating furnaces, etc. The equipment required for the manufacture of this gas are gas producers costing $25,000 to $30,000 each for standard size, (4000 to 5000 lb. per hour capacity), requiring coal handling, ash handling, soot chambers, space and maintenance. The efficiency of the cycle is 75 to 85 per cent, depending on use of sensible heat in the producer gas, the location of producer house in relation to furnaces, etc.

CUTTING costs through using erstwhile waste material has been a major indoor sport of American industry during the past decade. Sometimes these materials are not entirely waste, whereupon a better utilization of them is sought. In this article the subject of blast furnace gas as a metallurgical fuel is surveyed with regard to a number of present and possible uses. Limitations are pointed out and it is shown how, by certain enrichment of the gas, it can be made to serve a much higher purpose than those to which it is customarily put.

The cost of producer gas is made up of price of coal, steam, labor, maintenance, interest, amortization, etc. Experience shows that all these charges can be lumped and quoted as surcharge on coal values, say 35 to 30 per cent of coal cost. Roughly speaking, gasification charges run between $1.25 and $2 per ton of coal.

$$13{,}500 \times 2000 = 27{,}000{,}000 \times 0.8 = \frac{21{,}600{,}000}{150}$$

B.t.u. 145,000 cu. ft. of gas. Cost per 1000 cu. ft. varies between 3 and 4.5c., based on coal prices varying between $3 and $4.50 a ton.

From these data it appears that, if blast furnace gas can be used for competitive purposes in applications where producer gas is ever used, the value of the blast furnace gas can thus be increased by 50 to 100 per cent, as compared with its use as boiler fuel. In other words, the blast furnace is a gigantic producer and should be utilized as such. A 600-ton a day blast furnace generates the equivalent surplus gas of 5 or 6 gas producers (3000 to 4000 lb. an hour). A 1000-ton blast furnace can deliver enough surplus gas to do away with 9 to 11 gas producers.

Transformation cost of blast furnace coke into blast furnace gas is utilized to great advantage for ore reduction, instead of being a waste, as in the gasification process of the producer. It seems most logical, therefore, to put blast furnace gas to work as a metallurgical fuel wherever conditions indicate successful combustion conditions. A review of the possibilities is given.

For Coke Ovens

The high-temperature coking process is an operation requiring an exchange of heat in refractory chambers at temperatures between 1500 and 2500 deg. F. Producer gas has proved a good fuel, as has coke-oven gas.

Blast furnace gas has been demonstrated an ideal substitute. Unfortunately, this requires rebuilding of the coke ovens and addition of gas checkers. That calls for large capital outlay, which eliminates this application in old plants until batteries are to be rebuilt, for obsolescence. For new plants it is essential to consider blast furnace gas-fired coke ovens as having a good chance to show a saving.

Reliability of blast furnace gas supply is essential, which limits this application still further to those plants having 2 to 3 or more blast furnaces.

For Open-Hearth Furnaces

Melting and refining pig iron, ore and scrap in open-hearth furnaces requires the highest flame temperatures used in any industrial furnace—3000 to 3500 deg. F. Iron melts at 2700 to 2850 deg. F.

Blast furnace gas alone cannot possibly fit this condition, in spite of preheating of gas and air. But as a substitute for producer gas, as an admixture to other richer fuel (oil, coke oven gas, natural gas), it offers remarkable possibilities. Experience has shown that the practical facts bear out the theoretical calculations. Results of pioneer work along these lines will be reported in a later part of this study.

For Soaking Pits, Reheating and Heating Furnaces

Reheating processes require metal temperatures between 2200 and 2450 deg. F. to assure plasticity and reduce the power required for shaping, rolling, forging, etc.

Blast furnace gas fits these applications like a glove, with or without gas preheat, but always with air preheat in either regenerators or recuperators. The softness of the blast furnace gas flame, the leanness of the gas-air mixture, are extremely well suited to the furnaces, and these uses are bound to extend further as experience accumulates and the furnace designers adapt their construction to the characteristics of the blast furnace gas.

For Normalizing, Annealing, Drying, Etc.

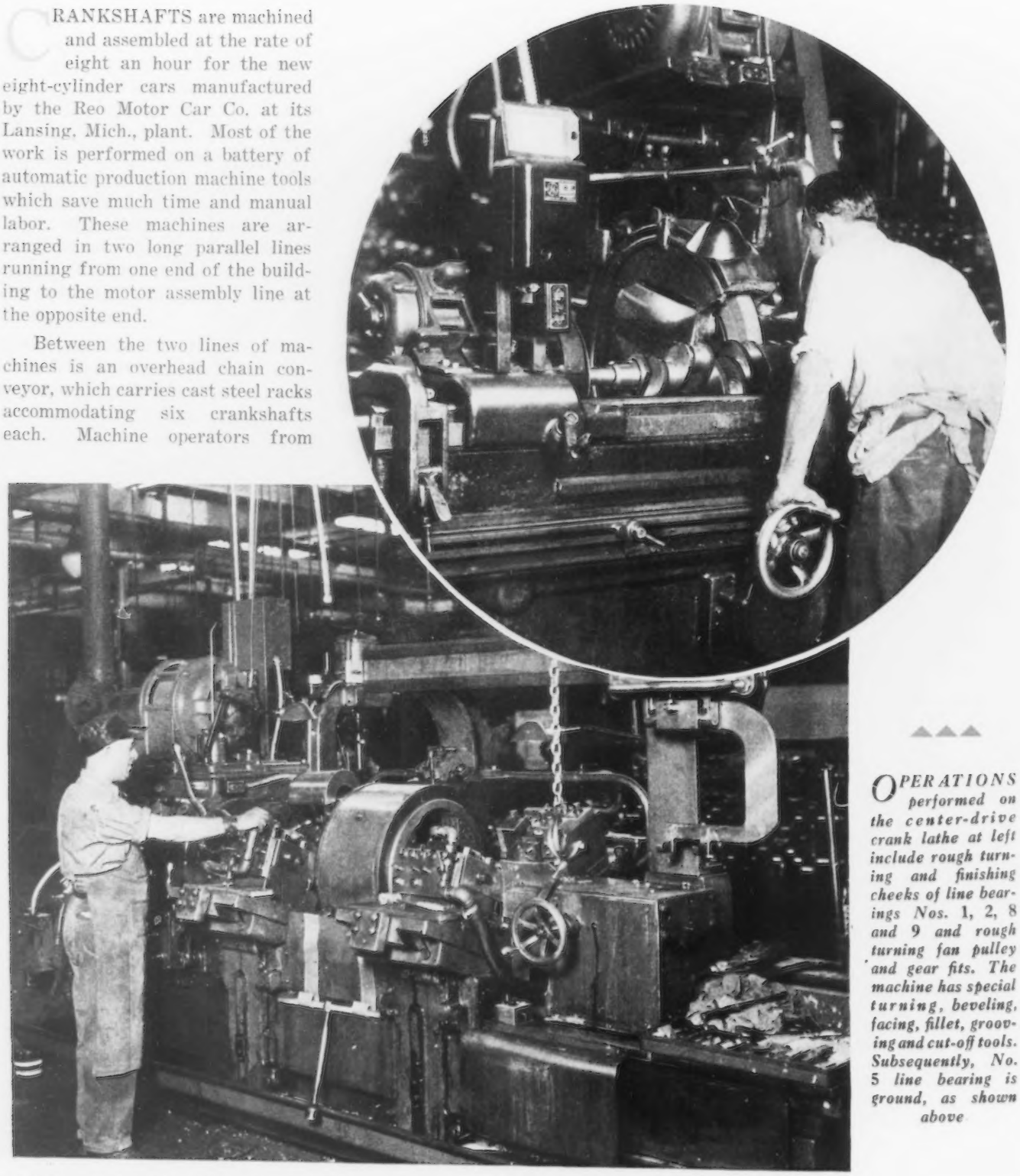
In heat-treating processes the temperatures are relatively low—usually less than 1600 deg. F. The qualities of blast furnace gas as a fuel are still more adaptable to these furnaces. The writer has knowledge of core drying and mold sweating which have been done for the past 20 years with great success, using blast furnace gas exclusively.

This study clearly demonstrates that blast furnace gas offers an attractive field for fuel economy in metallurgical furnaces.

Crankshafts for New Reo Cars

CRANKSHAFTS are machined and assembled at the rate of eight an hour for the new eight-cylinder cars manufactured by the Reo Motor Car Co. at its Lansing, Mich., plant. Most of the work is performed on a battery of automatic production machine tools which save much time and manual labor. These machines are arranged in two long parallel lines running from one end of the building to the motor assembly line at the opposite end.

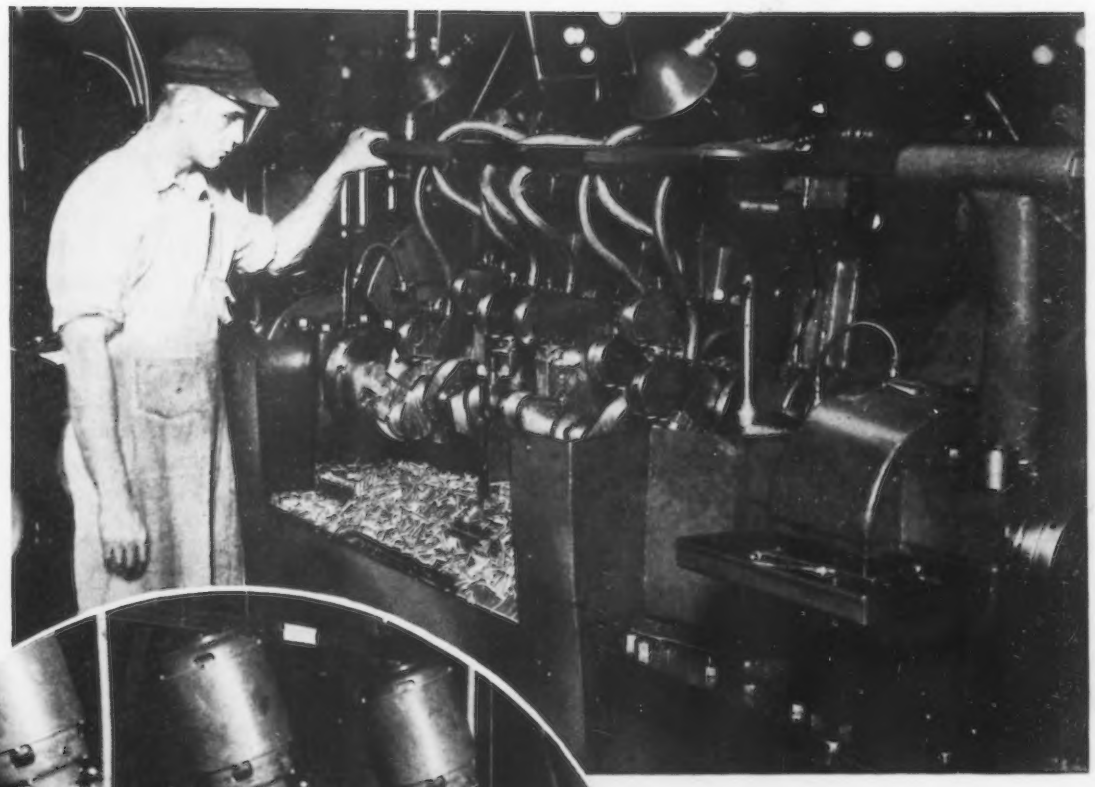
Between the two lines of machines is an overhead chain conveyor, which carries cast steel racks accommodating six crankshafts each. Machine operators from

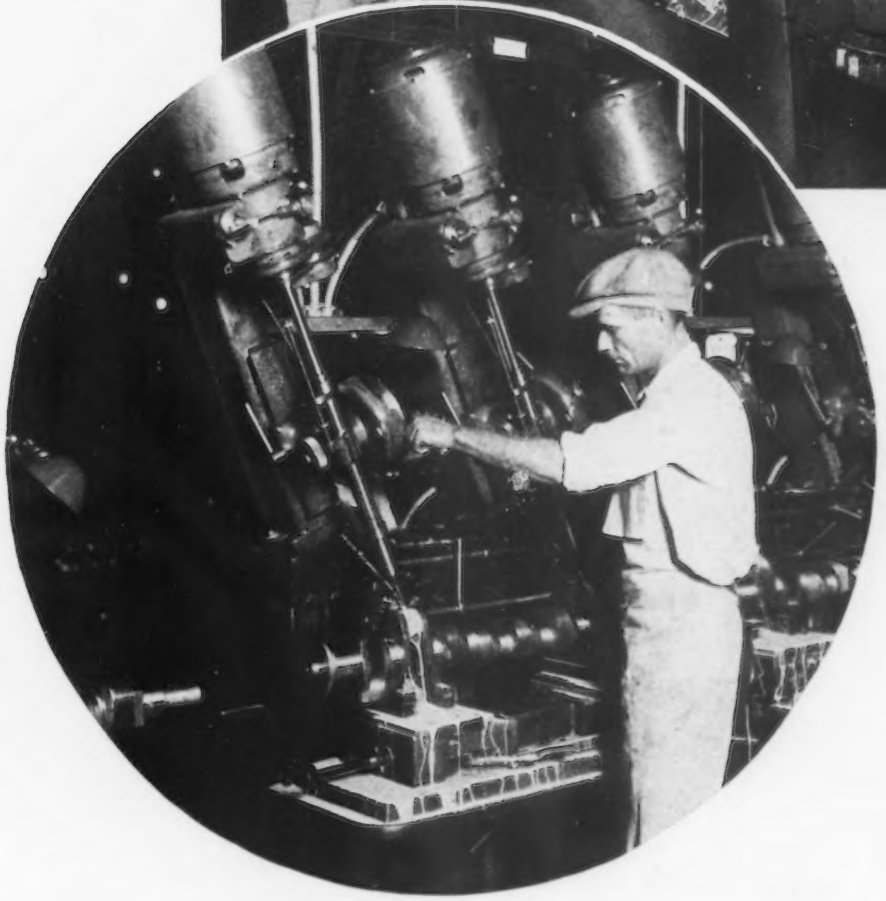


OPERATIONS performed on the center-drive crank lathe at left include rough turning and finishing cheeks of line bearings Nos. 1, 2, 8 and 9 and rough turning fan pulley and gear fits. The machine has special turning, beveling, facing, fillet, grooving and cut-off tools. Subsequently, No. 5 line bearing is ground, as shown above

Machined Economically

Motor Assembly Line Also Embodies Time and Labor Saving Equipment

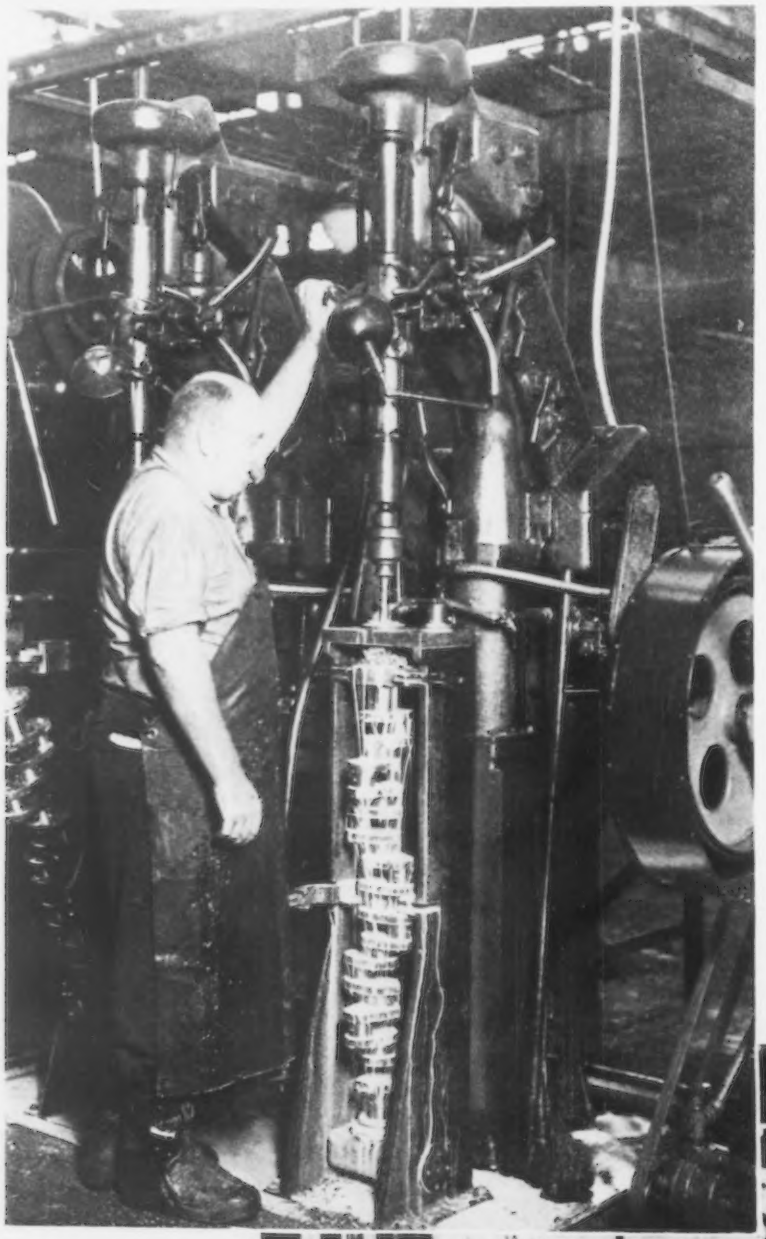




THE turning of line bearings on a crank lathe is shown at the right. The next operation is drilling ¼-in. oil holes to the pins, the drilling of the holes to Nos. 2 and 7 pins on a special two-spindle drill being shown below

either line can take crankshafts from these racks with little effort. If an operator needs a new piece of work, he can walk a few steps away from his machine to a rack and secure a crankshaft. The conveyor is of the endless type, progressing down the crankshaft line to the motor assembly line, where it backtracks with empty racks to the head of the crankshaft department.

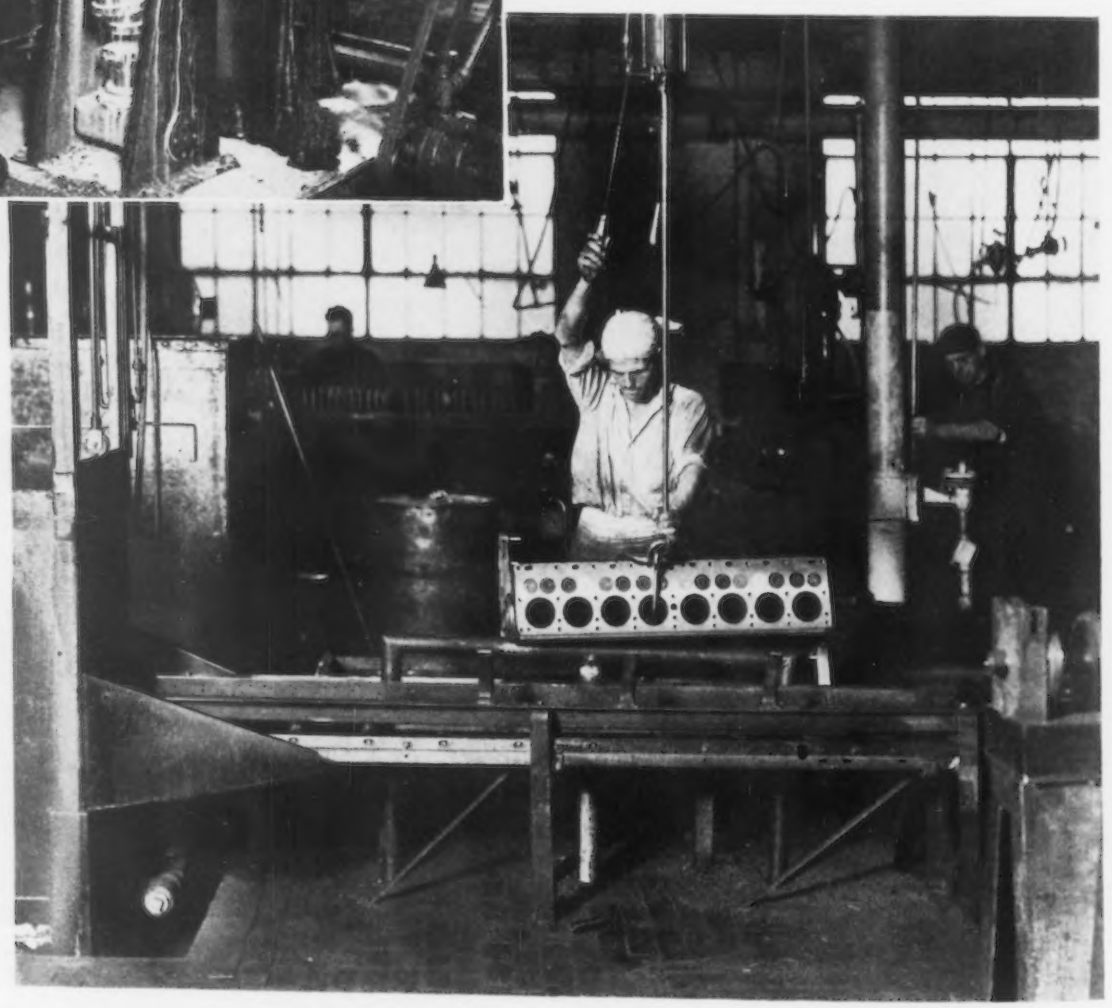
In the first machining operation the cheek of No. 5 line bearing is rough-turned and finished on a No. 16 LeBlond automatic lathe. The same work is done on the cheeks of line bearings Nos. 3, 4, 6 and 7 on a 4AC LeBlond double-end crank lathe. There follows a series of operations all



of which are carried out on a 4AC LeBlond center-drive crank lathe, equipped with a number of special turning, beveling, facing, fillet, grooving and cut-off tools. The operations include rough-turning and finishing of cheeks of line bearings Nos. 1, 2, 8 and 9, rough-turning the fan pulley and gear fits, rough-turning the flywheel flange and oil slinger and turning the rear-end shaft extension to a finished diameter.

The stub and flange end are cut off and centered on an 18-in. American lathe. After recentering the ends, the crankshaft is straightened in an 8-ton General flexible power press. It then passes to two Norton grinders where line bearings Nos. 1 and 5 are ground. From there it goes to a No. 12 LeBlond automatic lathe, on which the flywheel flange is semi-finished, turned and faced, the rear face of the flywheel flange is under-cut to size, the oil-slinger flange and the bolt head circle are semi-finished, and the oil-slinger and oil-seal grooves are finished to size. The face ends of No. 9 bearing also are semi-finished.

No. 9 line bearing is ground and then Nos. 1 and 18 cheeks are milled for index location, the latter work being performed on a 24-in. Cincinnati duplex miller. A 5AC LeBlond automatic pin lathe is used to rough-turn and finish the cheeks of all pin bearings. Succeeding operations in-

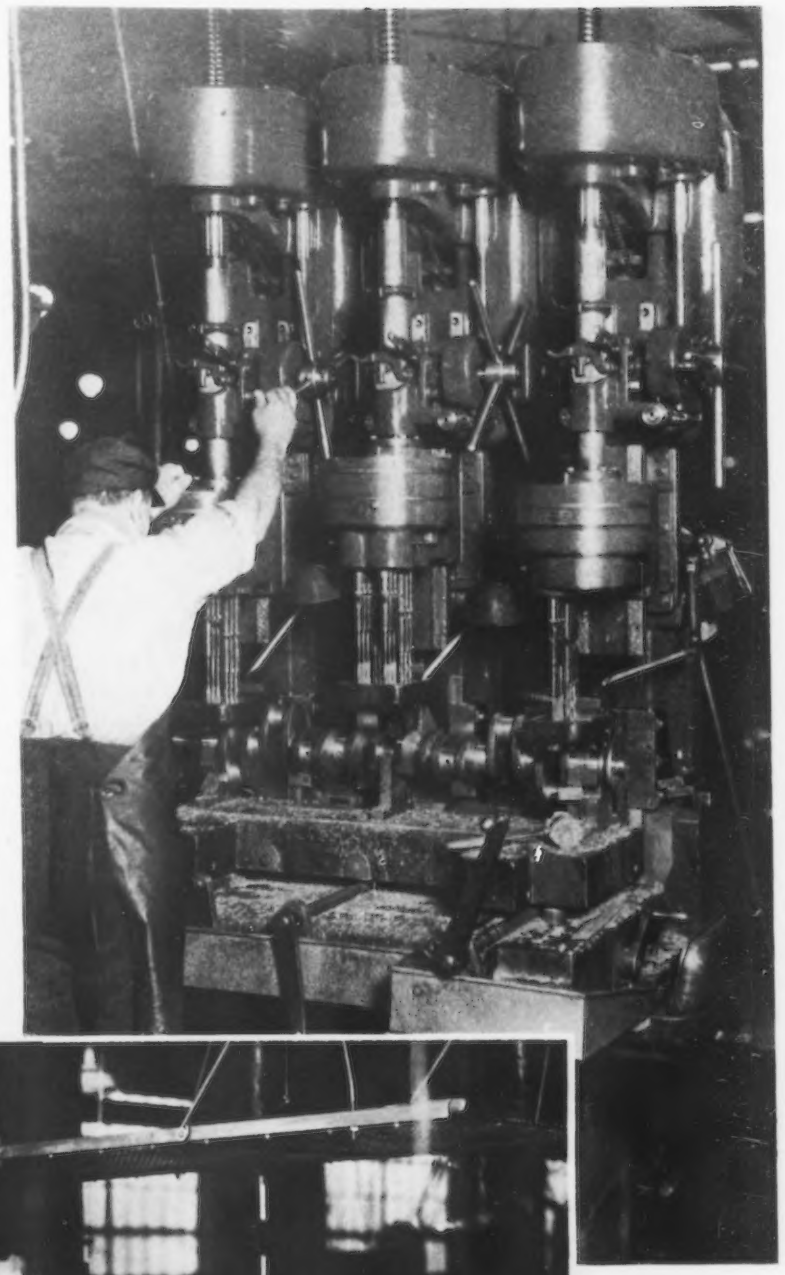


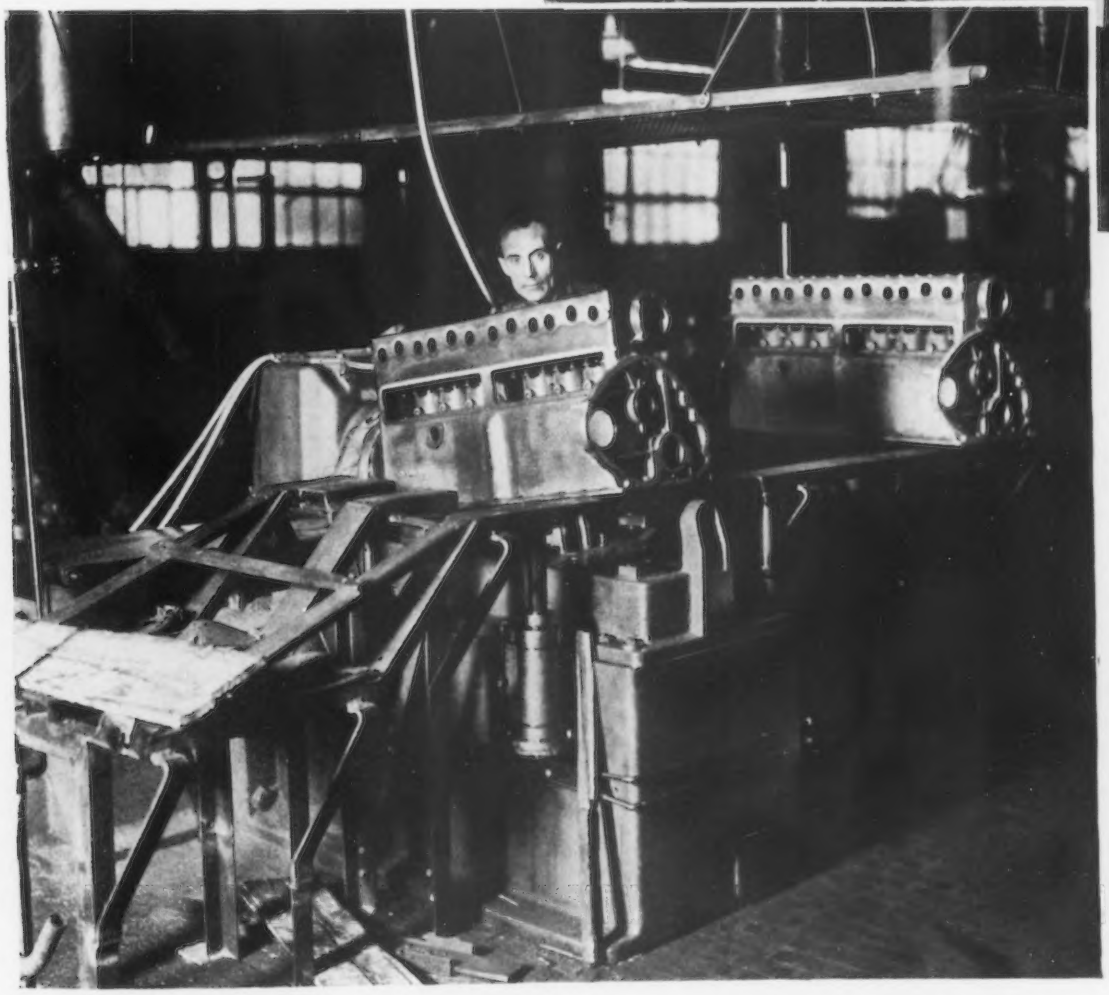
FOR drilling and counterboring the front and rear ends of the crankshaft, drilling machines equipped with a 17-in. riser block as shown above are used. The view at right shows the turnover slide on the assembly line used to turn the motor over prior to passing it through the washing machine

clude grinding of line bearings, straightening of the crankshaft on an 8-ton General flexible power press, and turning of all pins and of five line bearings on two Melling crank lathes. Quarter-inch oil holes then are drilled to the pins on a battery of special two-spindle drilling machines, after which the counterweight seats are milled on a Cincinnati Hydromatic milling machine equipped with a special 36-in. double arbor as well as special cutters.

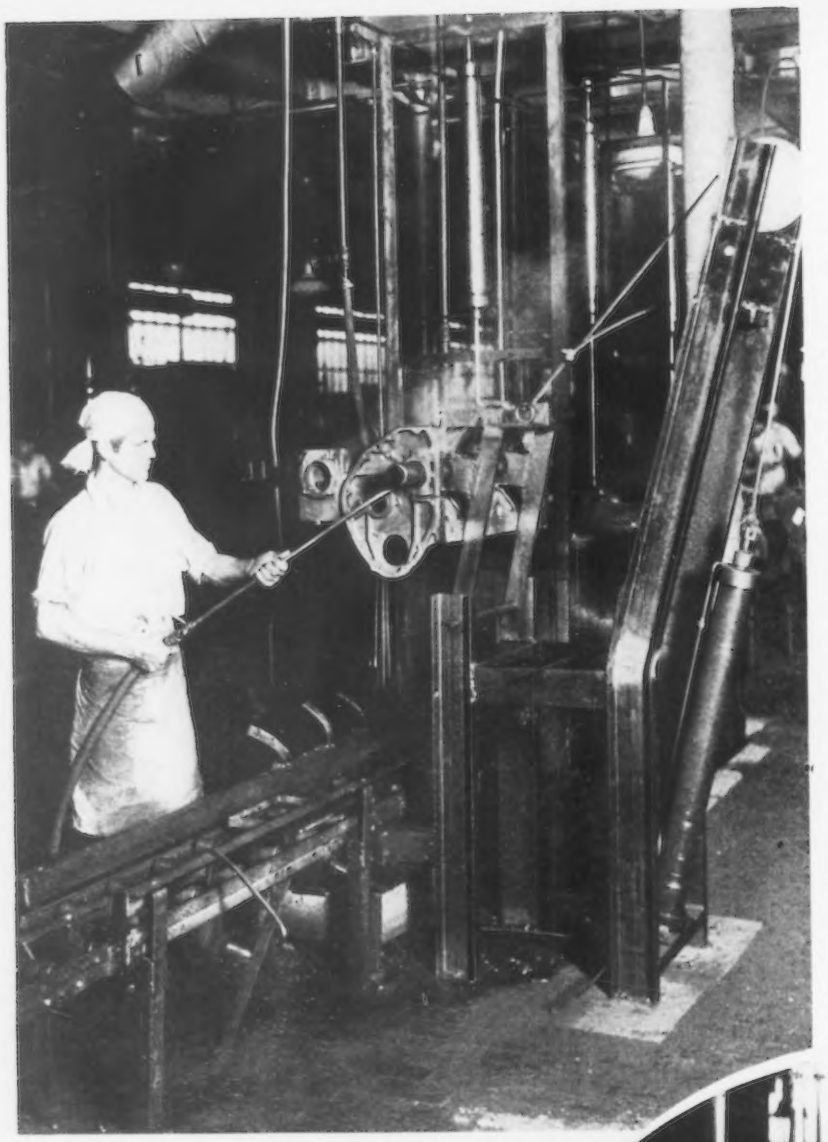
Two 21-in. Cincinnati Bickford special three-spindle drills have been installed for drilling and counterboring for counterweight bolts in the cheeks of the line bearings. All pins and line bearings are ground to finish size on a group of Norton grinding machines, and a ¼-in. keyway for the fan pulley key is milled on a Cincinnati milling machine. A No. 15 Woodruff keyway is milled on a hand mill.

The drilling and counterboring of the front and rear ends of the crankshaft are done on two Barnes drills, each of which has a 17-in. riser block. The clutch pilot bushing hole is bored, reamed and centered, and the flywheel flange is faced and chamfered on a Warner & Swasey turret lathe. Drilling, reaming and countersinking for flywheel bolts are the next operations, after which all bearings and pins are polished on a Lodge & Shipley lathe. Counterweights





SPECIAL 21-in. three-spindle drilling machines have been installed for drilling and counterboring holes for counterweight bolts in the line bearing cheeks. At the left is shown the special air fixture by means of which the motor is lowered on to the machine that mills the transmission face of the flywheel housing



AFTER passing through the washer, the motor is drained, a special device being used to raise it. In fitting the pistons, shown in view below, the motor is held at a 45-deg. angle in a rack on the assembly line

the line on a gravity roller conveyor at convenient working height, the width of the conveyor varying at places according to whether the motor is upright, upside down or at an angle for assembly operations.

At the beginning of the assembly line the motor is carried on a roller conveyor through an automatic washing machine, where it is thoroughly cleaned and then through a short oven for drying. Line reaming for the camshaft follows, after which the motor is picked up by a chain hoist and deposited in position for line reaming the crankshaft. Pistons are assembled with the motor held at a 45 deg. angle in a special rack. At this point there is a slight break in the conveyor line and the motor is moved a few feet on a short crosswise roller to the continuation of the line.

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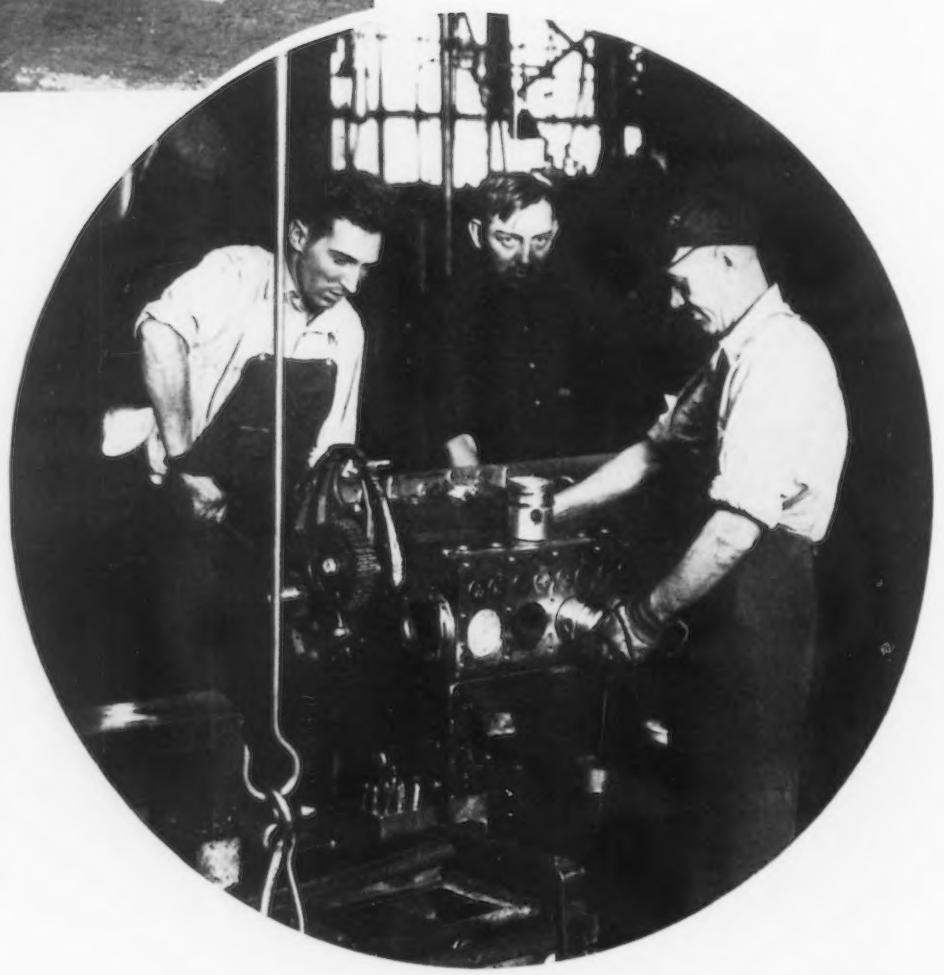


then are assembled, the crankshaft is put through the final straightening operation, and goes to a Gisholt precision balancing machine to be tested for balance. Counterweight screws are arc-welded into place on a bench and all pins and bearings honed. The clutch pilot bushing is assembled to the shaft on an Acme arbor press. The crankshaft moves to a bench with a fixture attached for straightening work. After being rigidly inspected, the crankshaft is hung on the conveyor rack and transported to the motor assembly line.

Motor Assembly Line Is of Straight-Line Type

ALTHOUGH the motor assembly line is of the conventional straight-line type found in practically all automobile plants, it embodies a number of interesting and somewhat unusual features. The motor is carried along

High-Speed Steel Treated in a Special Electric Furnace

By E. N. BROOKINGS

Metallurgist, Jones & Lamson Machine Co. Springfield, Vt.

ESSENTIAL in the heat treatment of high-speed steel parts is accurate method of timing and temperature control. When the gas-fired equipment of the Jones & Lamson Machine Co. was found to need extensive repairs, it was decided to install an electric hardening furnace. Details of the construction and operation of this all-electric equipment are given in this article.

UNIFORM heat treatment of large quantities of small parts, made of high-speed steel, necessitates either very strenuous attention on the part of the furnace operator or an accurate method of timing and temperature control. Naturally the latter method has proved the most desirable and our efforts toward the development of satisfactory heat-treating equipment have been expended in that direction.

The utilization of electric heat appeared attractive because of its ease of control, quietness, cleanliness, uniformity, and because our power rates are comparatively reasonable. Also, we had on hand an electric oven type furnace that could be used for preheating, and a Homo tempering furnace. Therefore, when our gas-fired equipment reached the point where considerable repairing was necessary, we decided to install an electric high-speed steel hardening furnace.

Naturally, considerable experimenting and checking were necessary before placing the equipment on a production schedule. However, this installation is now working quite satisfactorily, and at the present time all of the threading chasers for our automatic dies, as well as taps, lathe tools, and miscellaneous parts, are hardened by means of this all-electric equipment, shown in Fig. 1.

The loading table, where the parts are placed in nickel blocks for heating, is shown at "A." This is shown in more detail in Fig. 2. "B" is the Westinghouse electric furnace used for preheating. An American electric high heat furnace is shown at "C," from which the parts are quenchd into circulating oil in tank "D." The tempering operation takes place in Homo furnace "E." To each of these units considerable thought has been given for the maintenance of uniform conditions and to prevent spoilage of work, due to failure of some part of the equipment.

A preheating furnace "B" has been provided with a gas curtain just inside the door to prevent undue scaling of the work. The furnace temperature is maintained at about 1550 to 1600 deg. Fahr. by a Leeds & Northrup recorder-controller "F" (also seen in Fig. 2) equipped with an automatic alarm bell. A chromel-alumel thermocouple is used. The alloy heating unit is further protected by a gold temperature limit fuse.

The high heat furnace at "C" is heated by vertical Globar elements. The terminals of the bars are necessarily water-cooled and a continuous water supply is assured by valvular connections to two separate water lines. This furnace is also supplied with a gas curtain for atmospheric control. The temperature is controlled by a platinum, platinum-rhodium thermocouple connected to a Brown controller, shown at "G." A time clock at "H" closes the electrical circuit at any predetermined time nightly so that the furnace is ready for use when the shop opens the following morning.

This furnace is also provided with a second platinum, platinum-rhodium thermocouple connected to a Leeds & Northrup recorder with a range of 1500 to 3000 deg. Fahr. in case shown at "I." As this instrument can be read more closely than the controller, it is connected to red, white, and blue signal lights that are located directly in front of the operator. In Fig. 1 these are barely discernible behind the oil tank at "J," but may be more clearly seen in Fig. 3 between the two furnaces.

Following the usual custom, the blue light indicates that the temperature is too low, the red light too high, and the white light just right. The entire range permissible is plus or minus 7 deg., the temperature used being about 2350 deg. Fahr. more or less, depending on the nature of the work and the steel

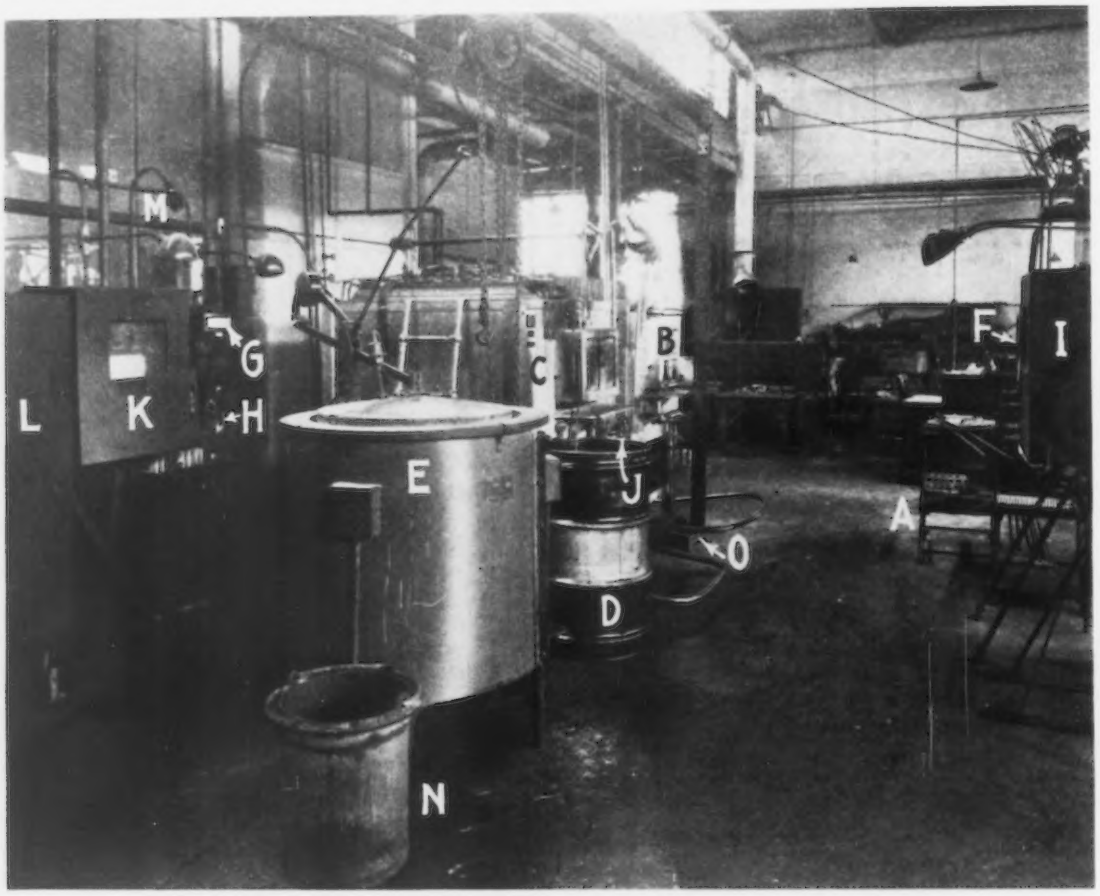


FIG. 1—The all-electric equipment for hardening threading chasers of high-speed steel

used. The two thermocouples are reasonable insurance against serious temperature errors. Any unusual variation between the two instruments is immediately investigated and the trouble remedied.

Foot Treadles Open the Doors

Both the preheat and high heat furnaces are provided with foot treadles for opening the doors. A short step and light pressure of the operator's foot causes either of the doors to rise. It will close of its own weight when pressure on the treadle is removed. When in use neither of the doors is ever completely closed, as better control of the gas curtain is obtained with an opening of about 2 in. This opening on the preheat furnace is obtained by placing blocks on the shelf of the furnace under the door as shown in Figs. 1 and 3. The door stop for the high heat furnace is shown bolted to the floor at "A" in Fig. 3.

As the operator releases the foot treadle the door falls, raising the treadle with its cross arm until the motion of the cross arm is arrested by the pin in the stop and in turn halts the downward motion of the door. Adjustment of the door height is made by placing the pin in the proper holes in the stop. Originally blocks were placed under the door as with the preheat furnace, but the continual falling of the door apparently caused the cracking of some of the Globar elements. At least, since the shock has been taken by the stop on the floor instead of the furnace frame, the breakage has decreased materially. A permanent ladder, shown on the side of the furnace, is of much assistance when adjusting or inspecting the Globars or terminals. The valves, shown at the front of the furnaces, are for adjusting the gas and air used by the gas curtains. The circulating oil in tank "D" is passed through a water cooler. The usual oil temperature is from 95 to 110 deg. Fahr.

The Homo furnace at "E" is controlled by Leeds & Northrup recorder-controller "K" and control panel in cabinet "L." Excessive temperature is indicated by red light "M" and by an alarm bell not shown. A standard basket used with this furnace is shown in the foreground, together with a Nichrome cone-shaped screen "N." This cone is placed with apex up at the bottom of the basket to prevent choking or blocking of the circulating air and local overheating of the charge. A hoist on the overhead rail facilitates the handling of work from the quenching tank and the tempering furnace.

Pure Nickel Blocks Used on Which to Load Parts

Parts treated may be seen in wooden trays in Fig. 2. Prior to placing in the preheating furnace the parts are loaded on pure nickel blocks as shown. These blocks are made by screwing nickel tubing into properly spaced tapped holes in rolled nickel strips and forging the upper ends of the tubing to accommodate the size of the work. These pieces of tubing must be sufficiently separated so that the "shading effect" of the parts on one another is eliminated. Otherwise the end pieces will be overheated or harder than the others. The tubing serves the double purpose of protecting the heels of the chasers from direct exposure to the heat and also raises the chasers from the base of the block, so that the speed of the heat penetration will not be retarded.

At present we are experimenting with blocks cast of nickel-chromium heat-resisting alloy in an effort to eliminate the machining and forging operations. Enough of these blocks must, of course, be used so

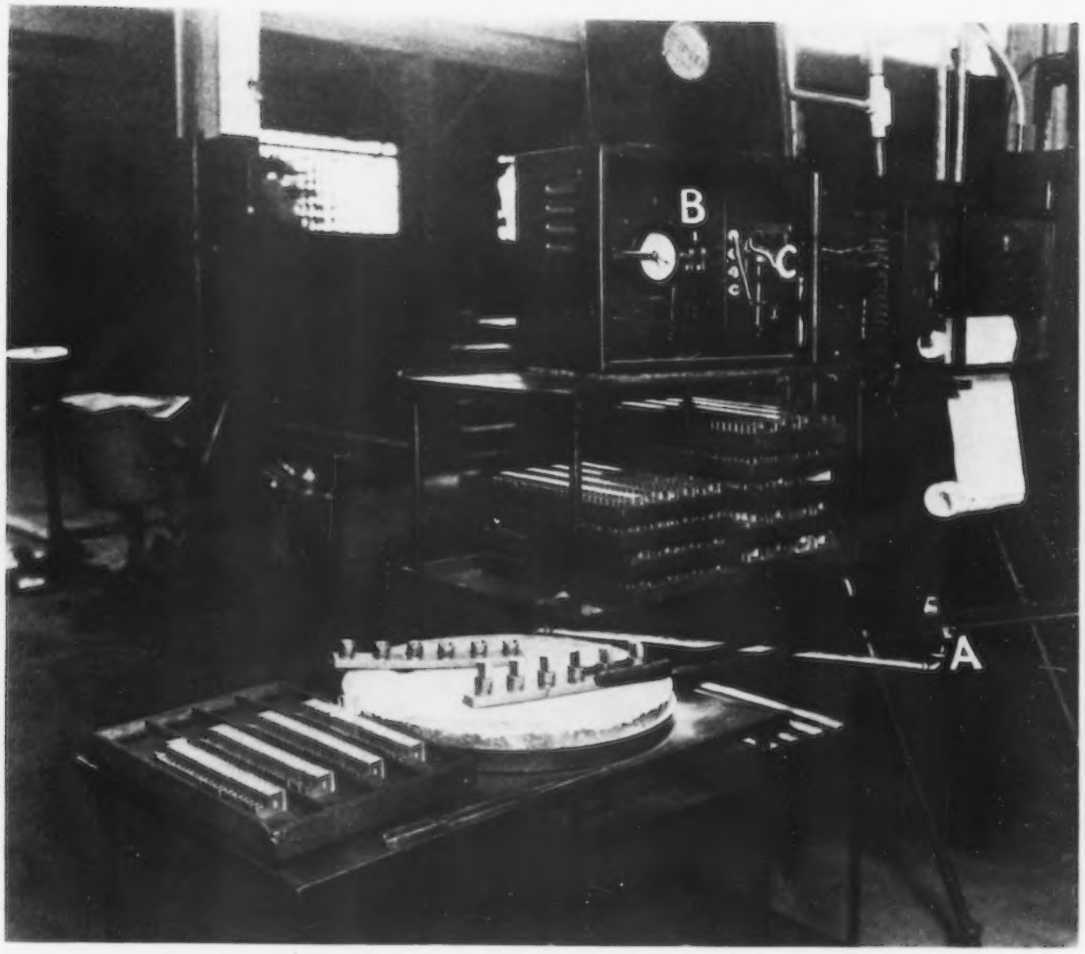


FIG. 2—High-speed steel parts to be heat treated are in the trays

that the heat-treating time cycle will allow the thorough preheating of parts in any one block.

Fig. 2 also shows the tongs for handling the work in position around one of the blocks and resting upon extension support at "A." The blocks are placed upon a slab of refractory material while being loaded, so that the heat from them will not warp or crack the iron table.

To the preheat furnace a two-step secondary hearth has been added, a casting of which may be seen at "O" in Fig. 1 and also in Fig. 3. Placed with the highest step in the back of the furnace, three steps are provided, including the front part of the regular furnace hearth. The nickel blocks with their charges are placed on these steps for preheating. By increasing the height of the steps consecutively toward the rear of the furnace, the use of longer blocks is permitted and the awkward motion of reaching behind the blocks in the front for those in the rear is eliminated. This secondary hearth is made of cast iron, as the cost is comparatively low and the life quite long. The long life is doubtless due in part to the gas curtain which prevents excessive scaling.

Special Timing Switch Regulates Hardening

From the preheating furnace the blocks are transferred singly to the hardening furnace. The exposure to the heat of this furnace is accurately timed and this is accomplished by a specially designed timing switch connected to an electric timing clock. The switch is attached to the shelf of the furnace as shown in Fig. 3. As the operator raises the door and inserts the charge, he allows the handles of the tongs to rest momentarily upon plate "B." This weight is sufficient to depress the plate and its attached vertical rod for a fraction of an inch and rotate bar "C" upon its axis. At the same time, because of the connecting levers, the upper end of bent lever "D" moves to the right and assumes an approximately vertical position. A hidden pin projecting from the back side of "C" forces the diamond-shaped fiber piece "E" around upon its axis so that the contact blade "F" on the opposite end of "E" is moved downward against contact "G."

Motion of bar "C" against its stop pin is completed by means of spring "H." At the same time the pin operating "E" is moved upward and beyond "E," so that spring "I" is enabled to return contact "F" to its horizontal position away from "G." Thus a momentary contact has been made between blades "F" and "G," and this contact is utilized for closing the starting circuit of the timing clock.

Timer Is Adjustable in Seconds

The timer used is shown at "B" in Fig. 2 and is adjustable in seconds of time to a maximum of 3 min. and 48 sec. It is operated by a 110-volt synchronous motor and is controlled by magnetic starting and setting strikers. An adjusting knob is provided for setting to the time interval desired.

Contact between blades "F" and "G," above mentioned, allows the current to operate the starting striker and the indicating hand of the clock begins its journey to the zero position. The time interval has elapsed when this point is reached and an alarm bell rings automatically, this being the signal for the oper-

ator to remove the charge. The bell is located on the inside of the clock cabinet, above the bell-ringing transformer, shown below and to the left of the clock.

As the charge is removed, the block and tongs move across the furnace shelf under the door to quench the parts in the oil tank at the left. This motion causes the block to strike against lever "D," swinging it to the left from its vertical position to the inclined position, as shown in Fig. 3. Bar "C" is thus caused to reverse its previous rotation and raise plate "B" up to its former position. At the same time the hidden pin on "C" moves downward, rotates fiber piece "E" clockwise upon its axis, causing contact "F" to strike against contact "K." As before, spring "H" completes the motion of "C" against its stop pin and spring "I" returns contact "F" to its horizontal position between "G" and "K."

The contact between "F" and "K" is utilized to close the circuit momentarily and allow the magnetic striker to return the indicating hand of the clock back to the starting point. The alarm bell also continues to ring until this has taken place. A thick sheet of asbestos behind the switch protects the springs and fiber pieces from the radiant heat of the furnace.

It was found that when the time interval set on the clock was much longer than a minute, the instantaneous contact between the furnace switch blades did not keep the circuit closed for a sufficient length of time to return the indicating hand of the clock to the starting position. Therefore, a "delayed action" switch, shown at "C" in Fig. 2, was added.

Contact of the switch blades "F" and "K" (Fig. 3) allows the current to energize an additional magnet coil connected in parallel to the regular set-back striker coil. This second coil magnetically closes a switch when energized, so that both coils remain energized after the contact of the furnace switch blades is broken. The magnetism of this second coil also attracts an iron rod, drawing it slowly up from a loose fitting tube partly filled with oil. The speed of the action may be adjusted by altering the clearance between the rod and tube or by changing the grade of oil used. As the rod rises, a projection on the same opens a leaf switch in the coil circuit, de-energizing the coils and allowing the switch to open. The rod slowly falls back into the tube in readiness for the next set-back operation. The extra two or three seconds that this delayed action switch keeps the circuit closed is sufficient to return the indicating hand of the clock to any position on the dial.

FIG. 3 — A specially designed timing switch connected to an electric timing clock

Parts Are Quenched Only in Oil

High-speed steel parts only are quenched in the oil, after which the nickel block is placed on the loading table, a new charge is put into the high heat furnace and the empty block is reloaded and placed in the preheat furnace.

Thus the timing is automatically controlled by the charging and discharging of the work with practically no extra motions on the part of the operator. The entire system of timing, signaling and recording is operated from the 110-volt lighting circuit.

(*Concluded on page* 1360)

British and Continental Open-Hearth Steel Works—a Comparison

By H. C. WOOD

PRACTICALLY the whole of the output of steel in Great Britain today is made by the Siemens-Martin (open-hearth) process. On the Continent, on the other hand, the Siemens-Martin process has for over 50 years found a very strong competitor in the basic Bessemer converter, or "Thomas" process, as it is generally called.

Without a doubt this competition between the two leading steel-producing processes has given the followers of each process every incentive to improve their practice and performance to the greatest possible degree. This applies in particular to the Siemens-Martin process, which, apart from the fact that it lends itself better to the manufacture of a very wide range of steel qualities and the utilization of large quantities of scrap, has been susceptible to large variations in the method of working charges, and in the design of furnaces and the material-handling equipment employed, to make it more capable of competing with the usual lower cost of production of Thomas steel.

Open-hearth furnaces existing in Great Britain and Germany, including those installed in steel foundries, are shown in Table II. This reveals that, of small-size furnaces, Germany possesses a far greater number than Great Britain, whereas in respect to units of 35 to 40 tons capacity and upward the latter shows a great numerical superiority. The total furnace tonnage capacity of the two countries shows approximately 17,000 tons for Germany and 32,000 for Great Britain.

Having regard to the fact that the total tonnage of steel made by the open-hearth process is nearly equal in the two countries, the great furnace tonnage capacity difference may be due in part to the fact that perhaps a greater number of furnaces in Great Britain than in Germany are inoperative (probably 40 per cent), and partly also to the greater tonnage obtained per unit in Germany. Tilting furnaces installed in the two countries number 35 in Great Britain and 32 in Germany.

Outstanding Characteristics of Modern Steel Plants

Perhaps the most striking characteristic of up-to-date open-hearth steel plants is the small number of furnaces employed to obtain large outputs. In place of a long string of furnaces being employed to yield an output of, say, 25,000 tons a month, this is now often obtained by four units only, of which three are in use at a time.

This limitation of the number of furnaces used insures greater ease of control, a reduction in capital outlay on the plant, and in particular in the cost of the building, crane tracks and foundations, and, further, a reduction in the time and cost of bringing the material to be charged to the furnaces and dealing with the finished casts. With the use of tilting furnaces, the further advantage of the possibility of keeping the capacity of the ladle cranes within reasonable limits is also obtained. In turn, the cost of the crane runways is proportionately low.

Demand is for ever-improving steel qualities, with, if possible, a decrease in the cost of conversion. In the working of phosphoric iron, in particular, the advantage gained through the employment of tilting furnaces is undeniable.

The uniformity in the general arrangement of modern steel-works installations in Great Britain and on the Continent is remarkable. In practically all cases, the scrap yards are situated parallel and adjacent to the furnaces, and not at a distance, as in American practice.

▲ ▲ ▲

STEEL-MELTING practice on the Continent of Europe differs considerably from that in England and still more from that in the United States. Some of the principal differences are outlined in Mr. Wood's paper, which was read at the Prague meeting of the British Iron and Steel Institute. There is a good deal more use made of tilting furnaces in Europe than in the United States, and considerable study has been made of special forms of ports for both types of furnaces—tilting and stationary.

▼ ▼ ▼

Charging machines of the overhead revolving type are almost universally employed, although those of the revolving type running on the charging platform are in use at some steelworks of note, such as those of Appleby, Bolckow-Vaughan and Witkowitz. These have the advantage that it is possible to place an overhead crane runway at a moderate height above the furnaces, for the cranes which bring the hot metal to the furnaces.

In Table III the outputs of a number of furnaces of different sizes in use in Great Britain, Germany, Italy, France and Czechoslovakia are given. These may be taken as representing the best practice in each specified country. The approximate coal consumption figures (expressed as a percentage of the tonnage of steel made) are given. Naturally, the output figures vary to some extent for each particular furnace, depending on the nature of the charge and the grade of steel made.

[Details of equipment and operating conditions for a number of important and representative plants are given in the paper.]

Furnace Construction

In general design the laboratory of open-hearth furnaces has experienced no marked changes for many years. The only innovation of note in the case of fixed open-hearth furnaces has been the introduction of the Naismith sloping backwall in the United States. It is in use also in England at Round Oak and at Taylor Brothers' Trafford Park steelworks, among others.

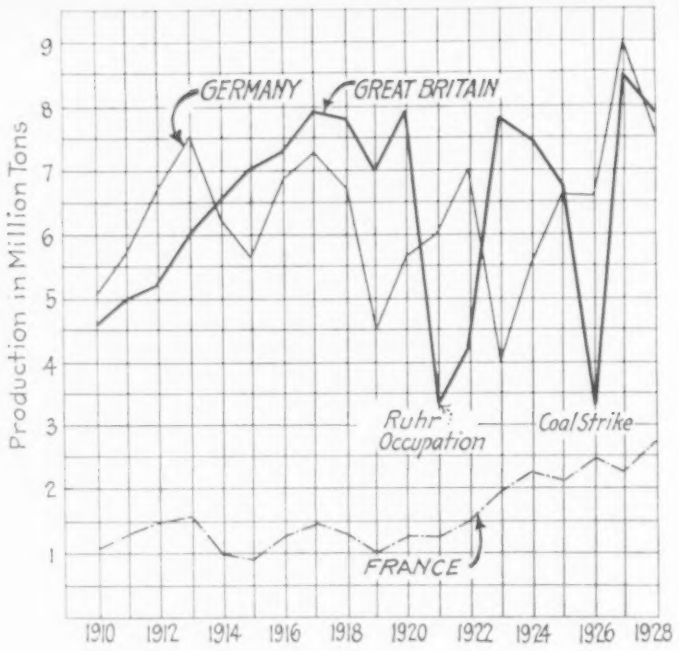
In the case of the furnace port ends considerable effort has been made, notably in the United States, in Germany and in Italy, to improve the direction of the gases introduced into the furnace, at the same time perfecting the combustion, and increasing the durability of the brickwork in the ports. In particular, the Venturi, Moll, Maerz and Terni port-end designs may be cited, all of them having effected appreciable improvements in their respective spheres in the output of furnaces, the saving of fuel and reduction of brickwork repair costs.

The Maerz port (illustrated) is designed in particular with a view to facilitating quick removal and replacement of those parts of the gas and air ports which are subject to destruction due to the action of the outgoing gases. These ports have been employed successfully in many furnace installations which have been made in Germany and some of the other countries.

Another illustration indicates the arrangement of the Terni port, which has been developed principally under the guidance of Fiorelli at the Terni steelworks in Italy. The principal features embodied are the provision of a combustion chamber in which the gas and air are intimately mixed. The air is introduced into the furnace by means of a fan, and perfect control of the velocity of the flame is obtained.

At the same time, the gas and air ports are so proportioned that they are able to accommodate the outgoing gases without undue friction. Furnaces fitted with such ports, therefore, give a larger tonnage output per campaign, 1000 charges and more having been made before the necessity of making a furnace repair arose. A distinctive feature of the Terni port system is, however, the fact that no water is required for cooling purposes.

Turning now to tilting furnaces, the employment of the Friedrich removable block, which was originally introduced for service in connection with fixed furnaces, is now frequently employed with good results. The arrangement of a port end for a large tilting furnace fitted with a Friedrich block is shown. The port end is built in one with the uptakes. But, in view of the fact that



Production of open-hearth steel in three countries through two decades

Table I.—Production of Steel Ingots and Castings, in Tons

Country	Year	Open-Hearth	Converter		Other Processes, Including Castings	Total
			Acid	Basic		
Great Britain	1910	4,595,366	1,138,103	641,012	.....	6,374,481
	1913	6,063,175	1,048,772	551,929	.....	7,663,876
	1920	7,984,100	552,500	268,400	262,300	9,067,300
	1928	7,831,300	475,900	.....	212,500	8,519,700
Germany	1910	5,113,758	171,108	8,030,571	383,201	13,698,638
	1913	7,613,904	155,138	10,629,697	536,350	18,935,089
	1920	5,615,555	45,102	3,219,624	397,601	9,277,882
	1928	7,509,453	28	6,548,027	459,595	14,517,103
France	1910	1,137,397	105,582	2,136,558	33,767	3,413,304
	1913	1,582,478	252,704	2,806,475	45,209	4,686,866
	1920	1,255,120	60,188	1,656,972	78,116	3,050,396
	1928	2,688,648	89,588	6,586,214	144,078	9,499,528
Belgium	1910	.....	.....	.....	.....	1,944,820
	1913	.....	.....	.....	.....	2,466,630
	1920	.....	.....	.....	.....	1,253,110
	1927	399,890	.....	3,192,600	87,680	3,680,170*
Italy	1920	633,537	.....	.....	140,224	773,761
	1927	1,383,561	.....	.....	212,209	1,595,770
Czechoslovakia	1920	.....	.....	.....	.....	973,006
	1927	.....	.....	.....	.....	1,732,000

*Includes Luxemburg.

there is a division between the front of the port and the end of the furnace to enable the latter to be tilted, it is possible to employ the Friedrich block with advantage, and in this way to increase the length of campaign of the furnace so provided.

It is essential to have an overhead charging machine fitted with an auxiliary trolley of sufficient lifting capacity, or to have available the services of an overhead crane for block changing. In the design shown, the block is made in two portions, the lower comprising the gas port and arch, and the upper portion the air port arch and sides. Key pieces are employed to make the joints with the fixed portion of the port end. In the case of a large-capacity furnace, the weight of the block will, if made in one piece, which is common practice, approximate 25 tons.

Table II.—Numbers of Furnaces of Varying Sizes in Two Countries

Size of Furnace	Great Britain	Germany
10 to 12 Tons	14	40
15	12	65
20	13	53
25	20	39
30	42	78
35 to 40	116	66
45 to 50	145	53
55 to 60	103	39
70	69	10
80	13	18
100	8	11
120 to 300	25	6
Total	580	478

General Conclusions

Outputs obtained in Continental steelworks furnaces are found to be generally in advance of those made in Great Britain. Further, greater attention appears to be paid to the question of fuel economy and reduction of repair costs. The best available mechanical equipment is universally employed, thus insuring not only the economical, but also the quick handling of the incoming material.

Careful selection of scrap to be charged is practiced, to insure suitability for the particular class of furnace employed and grade of steel to be made. Bundling presses are employed for dealing with light scrap, thus insuring quick charging.

The high efficiency of the furnaces employed and the scientific system of control are notable features. The time allowed for furnace fettling after tapping is cut down to the minimum. Encouragement is given to the introduction of improvements in the design of furnaces, handling equipment, and general practice.

Stresses Furnace Yields

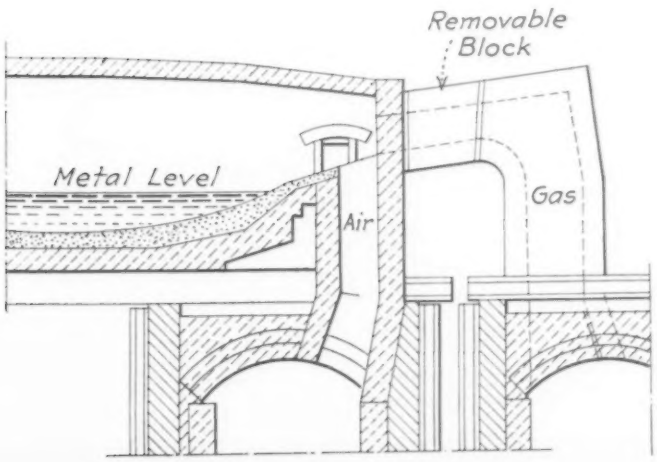
G. R. Adamson, Hyde, Cheshire, in discussing this paper, said that open-hearth practice in England has been developed most along the lines of (1) boosting the air supply; (2) high velocity of air; (3) use of waste-heat boilers and therefore mechanically induced draft. He recommended increased capacity of furnaces and better ports. He expressed surprise that the steam productions quoted in Mr. Wood's paper were not higher, as he would expect about 50 per cent greater production than those given.

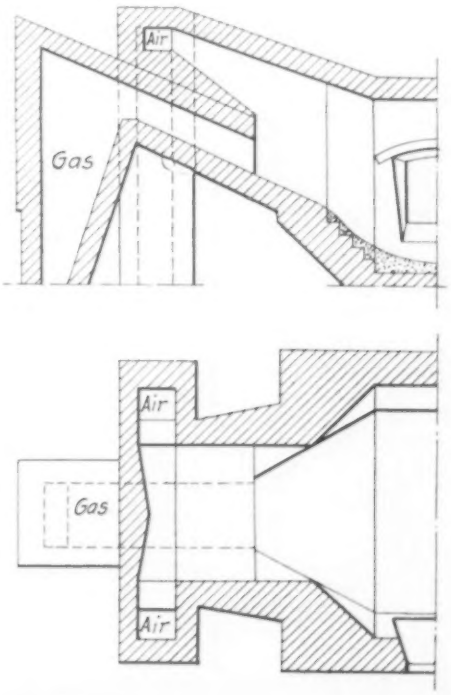
J. Henderson, Scunthorpe, Lincolnshire, member of council of the institute, referred in detail to comparative practice given in Table III. Regarding the 300-ton tilting furnace at Appleby, with which plant he is connected, he said that the size is too large for the present capacity, and that these large furnaces give good economy because of their heat efficiency and lower labor costs.

The reason why English furnaces are not doing so well as many examples of Continental practice given in this paper lies in the obsolete type of some of the [British] equipment and the difficulty of making alterations under present conditions in England. In his opinion, the yield (94 to 95 per cent) given for fixed furnaces in the paper is lower than it should be, while the yields of 103 to 105 per cent for tilting furnaces are so high as to arouse some question as to the basis of calculations.

TERNI port, at right, with combustion chamber for mixing the air with the fuel

Maerz port, below, with arrangement for removing eroded or otherwise damaged sections

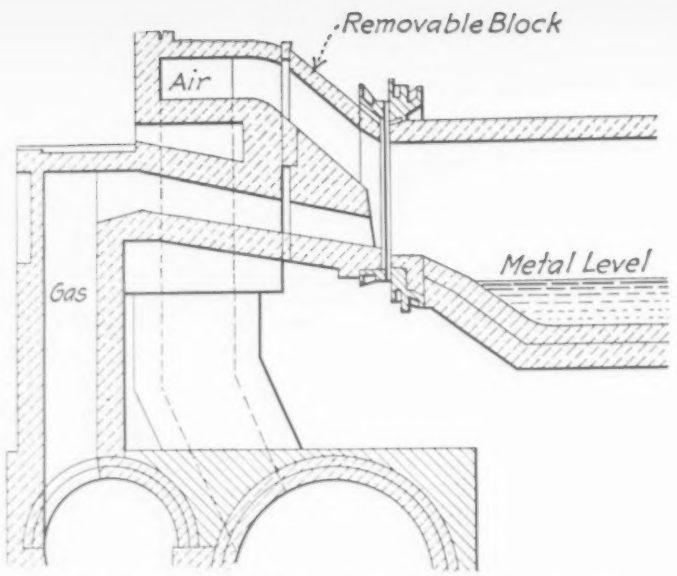




Bradley Stoughton, Lehigh University, Bethlehem, Pa., called attention to the rapidity of working illustrated in some of the examples given in Table III and elsewhere, and hoped that the author would give some details of the practice by which four heats are made regularly in 24 hr., using cold metal in fixed furnaces. At present, stationary furnaces with sloping backwalls represent prevailing practice in America. Fuel economy is obtained by (1) using a mixture of gases, such as coke oven gas with blast furnace gas, with or without added producer gas; (2) improved mixing of gas and air; (3) mechanical control of incoming and outgoing combustibles; and (4) improved heat insulation. The subject of better refractories, also, is receiving much study in America.

D. Sillars, South Bank, Yorkshire, asked if the difference between fixed and tilting furnaces is not a question of size. He called attention to the advantages of tilting furnaces in the possibility of removing basic slag for sale as fertilizer, but said that the quality of the product from the tilting (large-sized) furnaces is not so good as that from small furnaces. In his opinion the yield from fixed furnaces should be as good as that from tilting furnaces, and he thought that the yield of 94 to 95 per cent given for fixed furnaces was too low to be representative.

T. P. Colclough, London, thought that the author should give more details of construction of furnaces.



Friedrich port for tilting furnaces, with its removable block in two sections

He said that the essential for rapid working is a hot flame properly directed on the metal. The most striking change in Continental practice is to mix coke oven gas and regenerate it, rather than use it cold and raw.

In his opinion the open-hearth manager should not aim at high steam production, since that implies poor furnace fuel economy. The desideratum is to utilize the fuel in the furnace and regenerate to the highest possible temperature, using cooling water to maintain the ports. He said that there are now 400 furnaces in the United States using Naismith sloping backwalls.

Replying to the discussion, Mr. Wood said that two large American steelworks are interested in the Terni furnace. In his opinion, tilting furnaces gave as high quality product as fixed furnaces, except for alloy steels and the like.

A report of investigations, soon to be issued by the United States Bureau of Mines, deals with the concentration of chromite ores.

Tests indicate that suitable ore dressing methods will produce a satisfactory separation between chromite and the minerals with which it is usually associated. Minerals ordinarily designated as chromite vary greatly in chemical composition and contain, in addition to the iron and chromium oxide of the pure chromite, considerable amounts of magnesium oxide and aluminum oxide.

Table III.—Representative Furnace Outputs from European Plants

Works	Rated Furnace Capacity, Tons	Type of Furnace	Hearth Dimensions, Ft.	Approx. Area of Hearth, Sq. Ft.	Area per Ton of Capacity, Sq. Ft.	Fuel Consumption, Tons per 100 Tons of Steel Made	Nature of Charge	Output in 24 Hr., Tons	Hourly Output, Tons	Hourly Output per 100 Sq. Ft. of Area, Tons
Appleby (England)	250	Tilting	45x13	560	2.24	17.5	Hot metal from mixer	285	11.9	2.1
do.	300	Tilting	45x15	650	2.17	17.5	Hot metal from mixer	300	12.5	1.9
Bochum (Hoentrop, Germany)	120	Tilting	36x14	480	4.0	16.5	Hot and cold metal	330	13.7	2.7
do.	180	Tilting	36x14¾	510	2.8	16.5	Hot and cold metal	360	15.0	2.9
Consett (England)	75	Fixed	33x13	395	5.25	26.0	Cold metal	175	7.4	2.0
do.	80	Fixed (Terni)	35x12	410	5.0	...	Cold metal	225	9.4	2.3
Dorman, Long (Britannia, England)	250	Tilting	47x16¼	700	2.4	19.25	Hot metal	350	14.4	2.0
Gueugnon (France)	30	Fixed	25x10	240	8.0	21.0	Cold metal	125	5.2	2.1
Krupp, Rheinhausen (Germany)	80	Tilting	36x14	480	6.0	...	Hot metal from mixer	330	13.7	2.8
Lysaght, John (England)	50	Fixed (Terni)	34x12¼	360	7.0	19.75	Hot metal	210	9.0	2.5
Meiderich (Germany)	200	Tilting	46x14	635	3.17	...	Hot metal from mixer	365	15.0	2.4
Oneglia (Italy)	45	Fixed (Terni)	27x11	290	6.4	20.0	Cold metal	175	7.3	2.5
Schneider, Le Breuil (France)	60	Fixed	28x13	350	5.8	...	Cold metal	180	7.5	2.1
Terni (Italy)	50	Fixed	29x11	310	6.4	19.5	Cold metal	200	8.3	3.2
Witkowitz, (Czechoslovakia)	200	Tilting	47x13	585	3.05	19.0	Hot metal	339	14.0	2.4
do.	180	Tilting	40x12½	475	2.64	20.0	Hot metal	303	12.6	2.7
do.	150	Tilting	40x12¼	465	3.1	20.0	Hot metal	282	11.7	2.5
do.	60	Fixed (Moll)	33x12	375	6.25	21.6	Hot and cold metal	224	9.3	2.5
do.	60	Fixed	33x12	375	6.25	21.6	Hot and cold metal	220	9.15	2.5

British Standard Keys and Keyways

By W. ROLAND NEEDHAM
Stafford, England

IN most overhung pulley, gearing and flexible-coupling drives, power transmission is the governing factor so far as keys are concerned. Certainly such keys are fit subject for standardization. In this connection the British Engineering Standards Association recommendations officially offered in Specification No. 46, Part I, 1929, deserve most careful consideration, as greatly assisting a most welcome and advisable unification in this matter of keys and keyways.

The present contribution is confined to the consideration of certain points in connection with plain parallel keys and keyways. Two issues have engaged, and still engage, the attention of many engineers. The one concerns the relative amount of penetration of key in shaft and surrounding hub respectively, and the other the merits or demerits of the rival rectangular and square varieties of key.

As regards the former issue the specification gives the association ruling upon the matter; and, as will appear, it is on sound lines both practically and theoretically. Probably wisely, having regard to the serious difference of responsible opinion that exists, the onus of choice between rectangular and square keys is left to the user. Alternative tables are given and accordingly the engineer can choose as his predilection dictates.

The earliest issue of the specification, i. e., that of

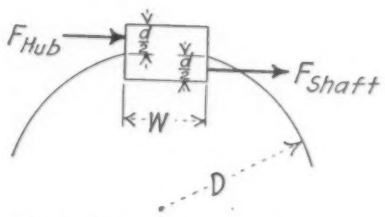


Fig. 1—Key and keyway as standardized in 1929

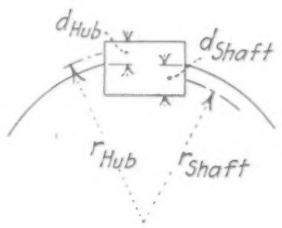


Fig. 2—Design for key and keyway to obtain equivalent crushing pressure in both axle and hub

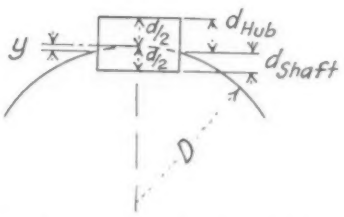


Fig. 3—Standardized key and keyway of 1909

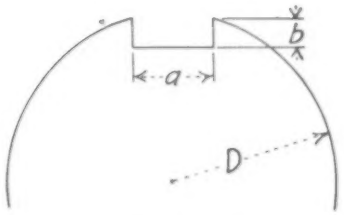


Fig. 4—Dimensions used in calculating modulus of section

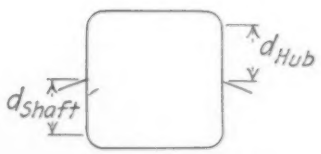


Fig. 6—Rounded corners fitting in fillets in the keyway relieve the worst stresses

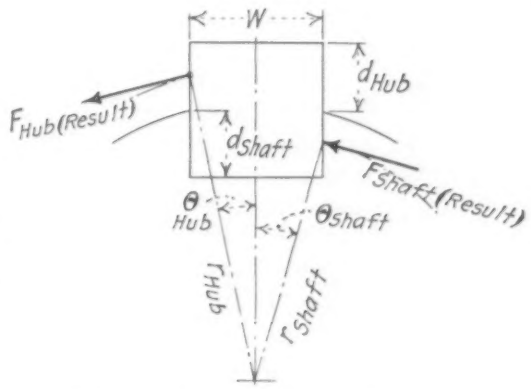


Fig. 5—Analysis of forces acting and angles through which they act

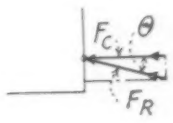


Fig. 7—Shows the incidence of the normal component, corresponding with the angular component previously considered

1909, stipulated the rectangular key. Its depth, as measured at the radial center bisecting the key width, was divided equally, half in the shaft, half in the hub. The issue of 1924, and now of 1929, refer the depths, alike of rectangular and square keys, to the sides instead of the center, dividing them equally there, half in shaft, half in hub.

This is sounder both in practice and in theory. Indeed, from the purely theoretical standpoint, the shaft should be given the slightly deeper penetration, since, torque being the same, the average crushing forces are virtually inversely proportional to the respective mean radii of the relevant surfaces. Then, approximately, Fig. 1,

$$F_{\text{Hub}} \times (\tfrac{1}{2}D + \tfrac{1}{4}d) = F_{\text{Shaft}} \times (\tfrac{1}{2}D - \tfrac{1}{4}d);$$

whence, $$F_{\text{Shaft}} = \frac{(\tfrac{1}{2}D + \tfrac{1}{4}d)}{(\tfrac{1}{2}D - \tfrac{1}{4}d)} \times F_{\text{Hub}} \qquad (1).$$

If now the key lengths in the shaft and the hub agree, to obtain equal average intensity of crushing pressure in the two surfaces it would be necessary to proportion them so that (see Fig. 2) approximately

$$d_{\text{Shaft}} = \frac{r_{\text{Hub}}}{r_{\text{Shaft}}} \times d_{\text{Hub}} \qquad (2).$$

Fig. 3 and the relevant relations show at a glance how badly the original proposal was out of proportion. The regulation 1909 key was *nominally* of width $\frac{1}{4}$ D and depth two-thirds the width. This gave a vers sine y of 0.016 D, a side depth of *nominal* hub keyway of 0.0992 D, and a side depth of *nominal* shaft keyway of 0.0674 D, and a consequent approximate shaft force 17.8 per cent in excess of the approximate hub force. Accordingly the unit crushing pressure in the side wall of the shaft keyway was for these nominal sizes some 73 per cent more than in the side wall of hub keyway.

STANDARDIZATION of keys and keyways has engaged the attention of engineers and designers all over the world for many years. There appears to be wide difference of opinion between the advocates of keys with square section and the shallower, rectangular keys. This article shows what the British standardizing authorities have done in connection with the matter, and explains why the measurement of depth of keyway occurs at the side of keyway, rather than at the center.

Later Specifications Better Suited to Facts

It must be clear therefore that the later issues of the specification contain much the sounder recommendations, for certainly as between the shaft and the hub parts there should be much closer agreement than a 1 to 1.73 ratio affords. In fact, the rooted objection to rectangular keys, held in certain responsible quarters, is based upon the dread of possible ill effects arising from high crushing pressures.

I am an unabashed partisan of the rectangular key. I consider that it should be perfectly permissible to allow crushing pressures on the side of the key or keyway up to a third the ultimate compressive strengths of the respective materials. The interested reader who supplements his perusal of the relevant specification data with a study of William Reavell's paper on "Standardization of Keys and Keyways"* will find therein detailed reference to the experiments officially undertaken with the object of comparing results from rectangular and square keys.

"The former (1913-1914) results," he states, "seem to indicate that with the mild steel the deep key was preferable, while in the forged steel the results were reversed. There was, however, so little difference between the two that no definite conclusion as to relative merit could be drawn. It was apparent that the smaller of the two keys was amply strong with mild or forged steel when used on an overhung shaft."

Of later experiments, made about four years after the Armistice, using 32 and 44-ton steels respectively, he adds, "The results confirm the conclusions from the first series, that the $\frac{5}{8}$-in. x 7/16-in. key is amply strong for a $2\frac{1}{2}$-in. shaft when using shaft material of an ultimate strength up to 44 tons (98,560 lb.) per sq. in."

Apparently only in the earlier series were any tests carried to destruction. In the instance named "the shaft itself failed by shear." It certainly seems undesirable to over-insist upon relatively low crushing pressures at key and keyway sides, at the expense of the torsional strength of the shaft, which decreases with the depth of keyway.

Though for the present purpose there are gaps in the most valuable information given in Mr. Reavell's paper, sufficient is told to enable the reader to deduce certain results and form at least tentative conclusions. A rough comparison of shaft and key and keyway stresses is possible and should prove illuminating.

Avoidance of Sharp Angles

In passing, reference may be made to an official recommendation made in the 1924 issue and repeated in the 1929 issue of the specification. Sharp reentrant angles, it is known, by favoring high local stress concentrations, constitute a serious menace where conditions are exacting. Fracture, when it occurs, usually radiates from some such unrelieved angle. Accordingly, the advice is apposite which states: "Where shafts are to be highly stressed, or subjected to alternating stresses or variable loads, the corners of keyways should be rounded to approximately one-fifth of their depth, the edges of the keys being rounded to correspond." Most engineers, on grounds of economy, would probably chamfer the key edges.

Where shaft bending stresses are negligible, torsion due to torque is the deciding factor. The shaft diameter so determined, the standard key, whether rectangular or square, to suit that particular diameter, generally answers admirably.

$$\text{Now Torque, } Tm., = 63{,}000 \times \frac{P}{N} \text{ lb.-in.} \qquad (3),$$

where P is horsepower, and N is speed in r.p.m.

*Institute of Mechanical Engineers, April 19, 1929.

The torsional stress in an uncut shaft of diameter D in. is: $f_{\text{Tm. (uncut)}} = \frac{Tm.}{Z_p}$

$$= \frac{320{,}500}{D^3} \times \frac{P}{N} \text{ lb. per sq. in.} \quad (4),$$

(Z_p is, of course, the polar modulus of section).

For a keyway-cut shaft (4) can be modified to suit, by the inclusion of a correction factor I/k, whence

$$f_{\text{Tm. (cut)}} = \frac{I}{k} \times \frac{320{,}500}{D^3} \times \frac{P}{N} \text{ lb. per sq. in.} \quad (5),$$

where k, per Prof. H. F. Moore's formula, derived from experimental results, $= 1.0 - \frac{0.2a + 1.1b}{D}$ (here see Fig. 4).

To simplify later expressions as much as possible the case is confined to that of a shaft *parallel* in the hub. The effective length L of the key is taken as $1.5 \times D$, both in shaft and hub. The rounded ends of many keys slightly complicate the relations, but here the area is assumed to be $L \times W$ sq. in.

Then approximately

$$f_{\text{shear (average)}} = \frac{2 \times Tm.}{D \times L \times W} \text{ lb. per sq. in.} \quad (6).$$

For the *nominal* proportions, where $W = \frac{1}{4}D$, and L is assumed to be 1.5 D, (6) becomes approximately

$$f_{\text{shear (average)}} = \frac{5.333 \times Tm.}{D^3} \text{ lb. per sq. in.} \quad (6a).$$

As regards crushing forces in the side walls of keys and keyways, it is near enough for rough and ready purposes to work on the basis of *resultant* forces, instead of the component normal to the wall surface. Even for standard *square* keys, where the disparity is the greatest, the resultant exceeds the normal component only about 2½ per cent in the case of the hub force and about 4¼ per cent for the shaft force. Referring to Fig. 5, the respective radii being in inches,

$$F_{\text{Hub (resultant)}} = \frac{Tm.}{r_{\text{Hub}}} \text{ lb.} \quad (7);$$

$$\text{and } F_{\text{Shaft (resultant)}} = \frac{Tm.}{r_{\text{Shaft}}} \text{ lb.} \quad (8).$$

Accordingly, the *approximate average* crushing intensities in the respective side walls are:

$$f_{\text{Hub (crushing)}} = \frac{Tm.}{r_{\text{Hub}} \times L \times d_{\text{Hub}}} \text{ lb. per sq. in.} \quad (9);$$

and

$$f_{\text{Shaft (crushing)}} = \frac{Tm.}{r_{\text{Shaft}} \times L \times d_{\text{Shaft}}} \text{ lb. per sq. in.} \quad (10).$$

For square, sharp-cornered keys of *nominal* proportions, where $W = \frac{1}{4}\ D$, and $L = 1.5\ D$, (9) becomes approximately average

$$f_{\text{Hub (cr.)}} = 9.5 \times \frac{Tm.}{D^3} \text{ lb. per sq. in.} \quad (9a);$$

(10) becomes approximately average

$$f_{\text{Shaft (cr.)}} = 12.2 \times \frac{Tm.}{D^3} \text{ lb. per sq. in.} \quad (10a).$$

For rectangular, sharp-cornered keys with depth two-thirds the width, other proportions as above, (9) becomes approximately average

$$f_{\text{Hub (cr.)}} = 14.8 \times \frac{Tm.}{D^3} \text{ lb. per sq. in.} \quad \textbf{(9b);}$$

(10) becomes approximately average

$$f_{\text{Shaft (cr.)}} = 17.5 \times \frac{Tm.}{D^3} \text{ lb. per sq. in.} \quad (10b).$$

Should the corners of the keys be rounded in accordance with sound practice for exacting conditions, the depths d (see Fig. 6) will be reduced to correspond.

Fig. 7 may interest the reader who wishes to work in terms of the normal component F_c instead of the resultant F_R. It will be seen that $F_c = F_R \times \cos.\ \theta = F_R\ (r^2 - 0.25W^2)^{\frac{1}{2}}$, taking θ as θ_{Hub} or θ_{Shaft}, and r as r_{Hub} or r_{Shaft}, as the case may be.

Tabled results concluding the present article are deduced from Mr. Reavell's paper. While actual stresses at breakdown cannot be stated, since in the earlier tests the final torque was not specified, and in the later tests the experiments were not carried beyond what was regarded as the maximum working range, the information does permit the deduction and presentation of highly significant figures.

It is not quite clear whether the keys were sharp-

(*Concluded on page* 1360)

STRESS AND PRESSURE INTENSITIES

(lb. per sq. in.)

	⅝ in. square key				⅝ in. x 7/16 in. rectangular key			
	Torque in lb.-in.				Torque in lb.-in.			
	Sharp Corners		Rounded Corners		Square Corners		Rounded Corners	
	20,000	45,000	20,000	45,000	20,000	45,000	20,000	45,000
f_{Tm} in shaft with keyway	8,000	18,000	8,000	18,000	7,600	17,050	7,600	17,050
(If without keyway.)	(6,500	lb. per	sq. in., w	here Tm.	=20,000	lb.-in.		
	14,600	"	"	"	=45,000	")		
f_{Shear} in key. (mean)	5,650	12,700	5,650	12,700	5,650	12,700	5,650	12,700
Mean crushing pressure in keyway wall of shaft*	12,150	27,300	14,500	32,750	16,700	37,600	20,300	45,600
Mean crushing pressure in keyway wall of hub*	10,550	23,700	13,300	29,800	15,450	34,750	19,300	43,500

*Under normal component.

Mechanical Cupola Charging

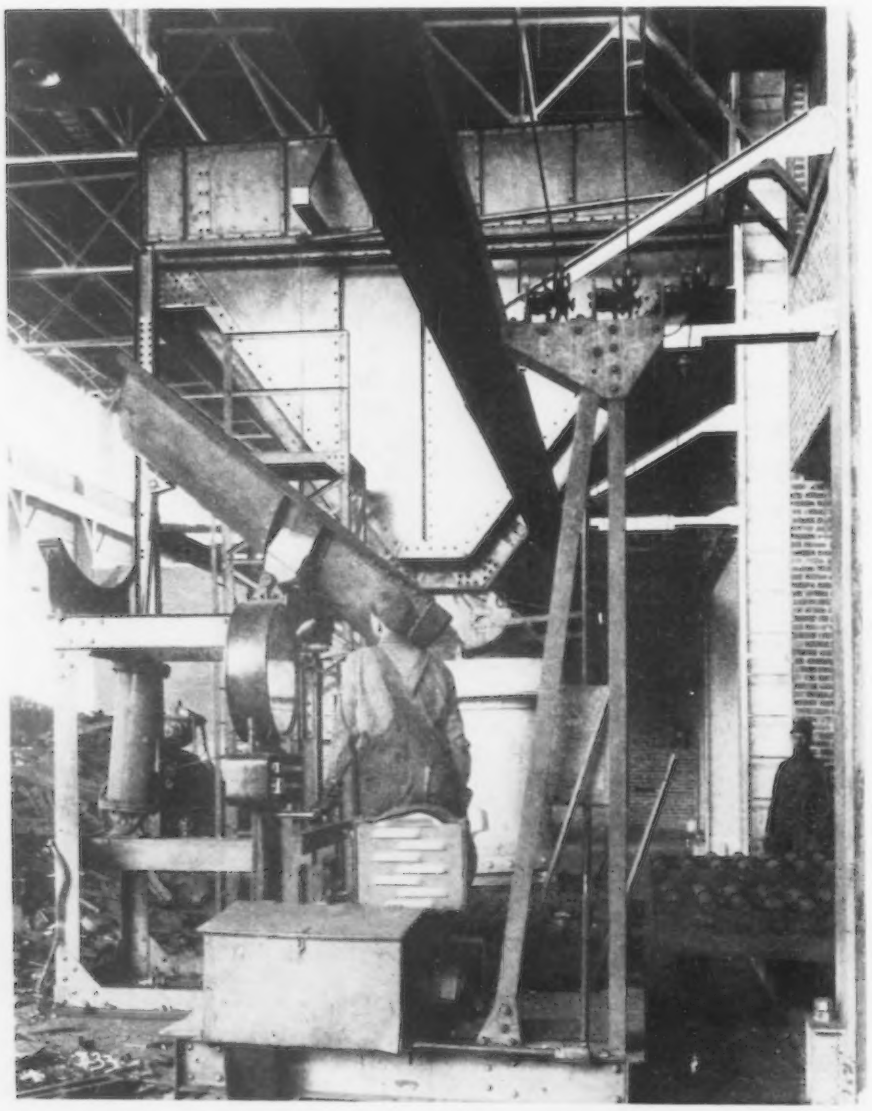
By CLEMENT A. HARDY
Mechanical Engineer, Whiting Corporation

THE first major improvement in charging practice for the foundry cupola consisted of improving the yard layout with bins and trackage so that charges could be made up on cars in the yard from the bins and delivered to the charging floor. The bins were served by overhead traveling cranes equipped with magnets for unloading scrap and pig iron.

Improvements were then made in the cars so the charges could be dumped into the cupolas direct from them without hand handling. This method did not properly distribute the charges in the cupola, however, and required some labor to level off the iron charges and the coke.

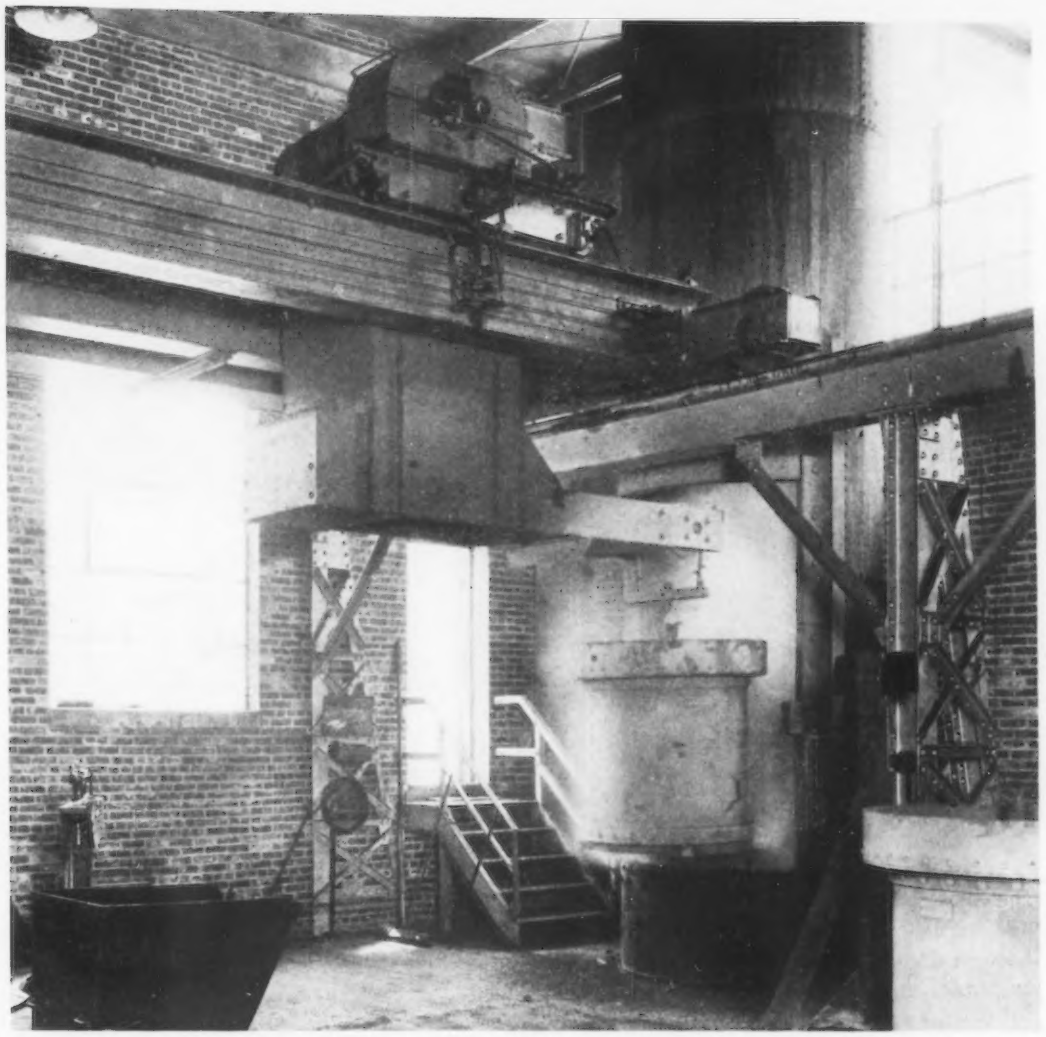
Several forms of machines for better accomplishing the distribution of the charge were devised, among them side-dump chargers operating from each side of the cupola; bottom-dump cars running into the cupola and dropping the charge; skip hoists and other devices. These were used with varying success, and each of them eliminated a certain amount of hand labor.

Some fifteen years ago, certain of the heavy melters conceived the idea of using a drop-bottom bucket in combination with an electric traveling crane to serve two cupolas, carrying the buckets into the cupola and tripping the bottoms, thus discharging the load. The buckets were loaded in the yard and picked up from the yard level by the crane. This type of drop-bottom bucket was followed by the introduction of the cone-bottom bucket which operated similar to the bell in a blast furnace, laying the iron charges around the



BUCKET loader and scale car which form part of the "wishbone" system at the Caterpillar Tractor Co.'s Peoria plant. The roller conveyor at the right carries the buckets to the charging crane

THE charging crane carries the loaded bucket into the cupola, sets it down on the "wishbone" and the bottom drops. This and the picture below are from the Caterpillar Tractor Co.'s practice



AFTER being carried on roller conveyors to a position below the well shown at the left of the charging floor in this picture, the buckets are raised through the well by the charging crane

▲ ▲ ▲

IN the Bayonne, N. J., plant of the American Radiator Co., the "wishbone" system was adapted to an existing crane by means of the attachment shown at left.

◇ ◇ ◇

CHARGING floor at the Pontiac plant of Oakland Motors Co., showing buckets and wells leading to the floor below.

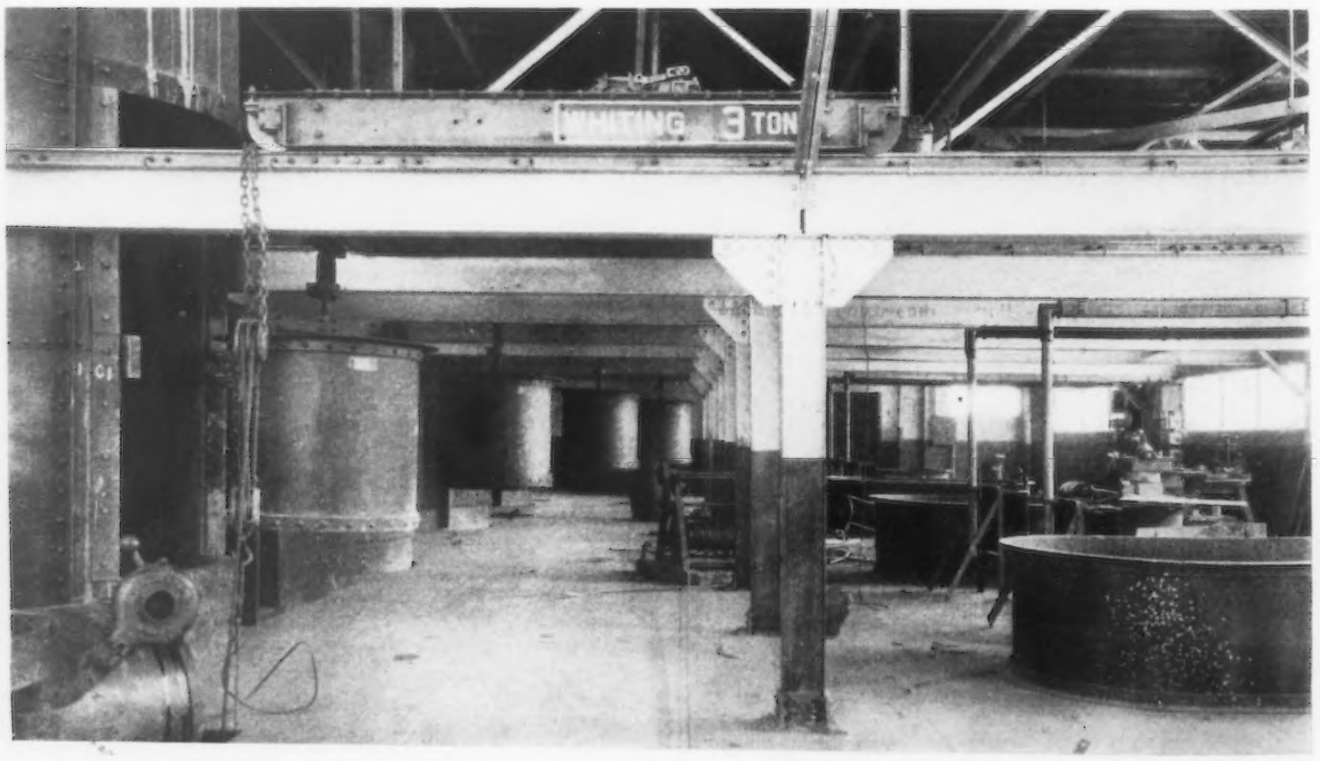
▼ ▼ ▼

shell of the cupola where, as every old cupola operator knows, the best melting conditions prevail.

Our company, having developed the side-dump charger and the balanced type of charging car, adopted the "wishbone" charging system. In this, a wishbone-shaped casting holds the rim of the bucket while the bottom is dropped, thus eliminating all latches and trip-lines and making the operation very simple.

With a proper system of coke hoppers, whereby the scale car carries the bucket under the coke chute, the labor is reduced to a minimum. The records show that daily melts of 300 tons in 9 hr. are made up and charged into the cupola with 5 men, using one yard crane man, one electric transfer car man, one man putting in additions, one charging crane man and one helper to hook and unhook. Several plants melting 100 tons a day use this system, using 4 men, and some smaller plants melting from 30 to 40 tons per day with a properly arranged yard use but 2 men.

The use of cone bottom buckets shows a marked economy in coke consumption over any method of hand-charging or other methods in former use. Records show that in stoveplate work, where very hot iron is required, with hand charging from the same level, the intermediate charges of coke required were 7 to 1 and after the installation of the machines and the cone-bottom buckets, these intermediate charges were cut 10 to 1.



Joining Light-Gage Sheet Metal by Arc Welding

By T. E. JERABEK

Metallurgical Engineer,
Lincoln Electric Co., Cleveland

Fig. 1. Showing the proper working position of the welding rod and the carbon electrode in arc welding light-gage metal

PROGRESS of the electric arc-welding process as a means of joining metal parts has been of intense interest for those whose business brings them into contact with the fabrication of mechanical and structural designs. But they have always had an intense skepticism for any attempt to join light-gage sheet metal by use of this process.

It was thought that the molten metal from the electrode would run through the thin sheets of parent metal when the pieces being joined were heated by the arc. Slight success has been attained with the metallic electrode by backing up the seam with copper, thus carrying away the heat more rapidly. This weld has been made strong and rigid, but the most desirable of weld characteristics, ductility, is not to be had in this manner of joining thin-gage metals. But today it is possible to use this process on metal as thin as No. 22 gage, and without danger of burning through.

Easy Enough to Handle No. 14 Gage or Heavier

Use of electric arc welding in joining sheet metal of No. 14 gage and heavier may be accomplished without difficulty by using the regular metallic or carbon electrodes, and regulating the current to suit the metal being joined. Metal of this thickness is sufficiently heavy to withstand a heat which will fuse the sheets together without burning through. An experienced welding operator can readily tell just how to regulate the heat and, with the better control made possible by present methods of stabilizing the welding current, will experience no difficulty in joining sheet metal with a smooth, even bead.

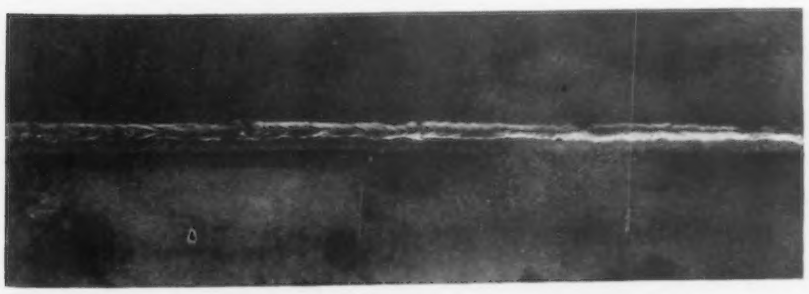


Fig. 2. A butt weld made on light-gage sheet metal with "Lightweld"

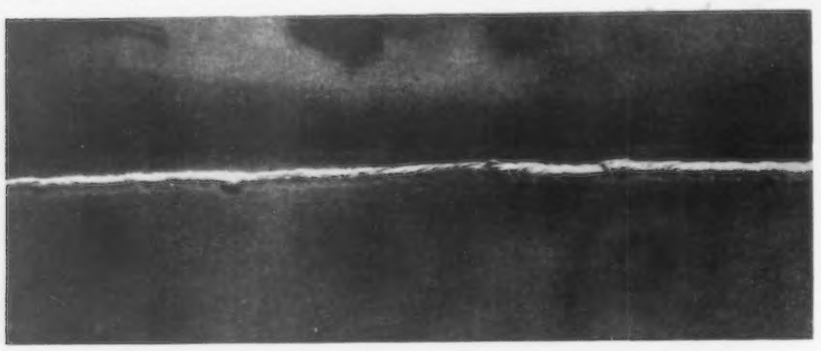
With metal lighter than No. 14 gage, and as thin as No. 22 gage, however, it is not entirely satisfactory to use the metallic arc-welding process. Successful welding of light-gage metal is accomplished by a special welding rod designed to be used manually with carbon electrodes. This method, produced by the company with which the writer is connected, is known as the "Lightweld" process.

This process may be used for either butt, corner or lap welds, on material of No. 16, 18, 20 and 22 gage, without a copper backing to carry away the heat. The rod is produced in 1/16-in. size and is used with a 5/32-in. carbon electrode. The carbon should be tapered gradually from a sharp point back about 1½ in., and should be gripped in the holder about 2 in. from the point. The electrode should be held directly over the seam, with the end at the weld tightly down against the sheet. The position of the other end of the electrode should be fairly close to the work, so that the electrode at the point of welding lies fairly flat and does not rise too abruptly from the work. An angle of about 15 deg. to the sheet works very well. The carbon should be kept at an angle of about 60 deg. to the sheet and pointed in the direction of the welding, as shown in Fig. 1.

When welding thin sheet metal in

Fig. 3. A corner weld made on light-gage sheet metal with the electric arc-welding process

Fig. 4. A lap weld on thin metal, made with "Lightweld" and the electric arc



this way, the arc should be maintained at such a length as to permit a continuous bead of molten metal to flow from the rod to the crater. The setting on the machine should be such that the current flow through the arc is properly obtained with the highest open-circuit voltage. Regular polarity should be used, namely, the work positive, and the electrode negative.

Speed of Welding Estimated

The speed of welding on light-gage metal depends on the type of joint, the gage of the material, the setup or tightness of the joint before welding and the skill of the operator. Fig. 2 shows a butt weld and Fig. 3 a corner weld, on light-gage material. Table I gives the current and estimated speeds on butt and corner welds made by the "Lightweld" process.

On lap joints, while it is not entirely necessary, it is desirable that there shall be very little if any gap between the lapped plates. A gap makes welding more difficult and slows up the speed. When the plates are not tight the electrode must be fed in to make up the deficiency. A circular back-and-forth motion should be used, to catch the upper edge and bottom sheet without burning back the upper edge too far. Fig. 4 shows a lap weld on No. 22 gage material. Table II gives the current and estimated speeds on lap joints, made with this process.

One of the chief advantages of "Lightweld" is that it is possible to do both vertical and overhead welding on thin-gage material. These welds in all cases are as strong as the parent metal and are extremely ductile. The pieces shown in Figs. 5 and 6 illustrate the extreme ductility of welds made with this process. The piece in Fig. 5 is a corner weld, such as the one shown in Fig. 3, which has been hammered flat and bent as shown. Fig. 6 shows a butt weld which has been twisted through 1080 deg.

In both of these samples the weld was made on No. 22 gage metal, and both retained their original appearance. This extreme ductility on light-gage metal is obtained by a special coating on the welding rod, and by the method of welding. Any welding operator can learn the method of welding light metal in a short time with a little practice.

In welding light-gage metal the most satisfactory method is to keep a globule of molten metal over the work at the point of the arc. This globule advances with the arc, boiling out the impurities as it goes, thus helping to prevent oxidation. The coating on the rod also prevents oxidation, thus permitting a smooth, flat weld of high density and great ductility.

Table I—Butt and Corner Welds

Thickness of Material, No.	Amount of Current, Amp.	Speed (Inches a Minute)
16 gage	60	9
18 gage	50	10
20 gage	40	10
22 gage	35	12

Table II—Lap Welds

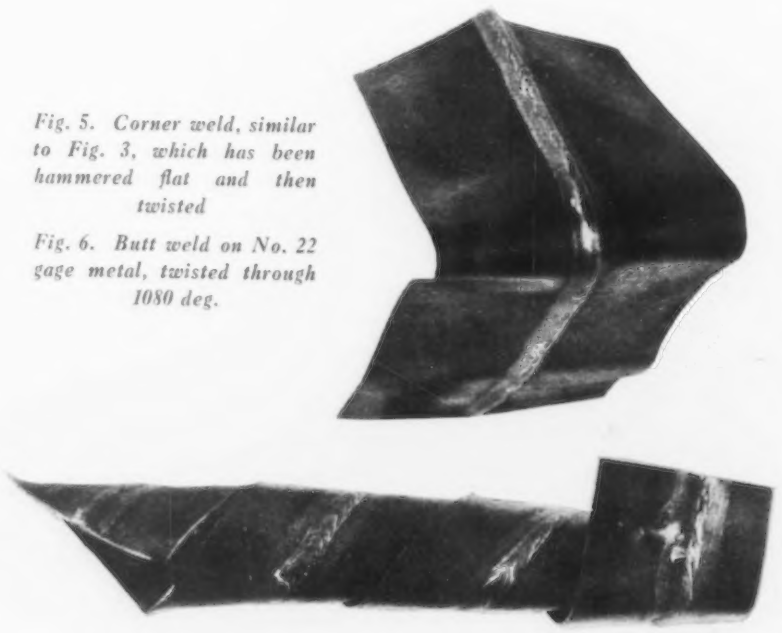
Thickness of Material, No.	Amount of Current, Amp.	Speed (Inches a Minute)
16 gage	55	8½
18 gage	45	9
20 gage	35	7
22 gage	30	7

E. C. Atkins & Co., Indianapolis, have received from the Byrd South Pole Expedition an award for cooperation in furnishing a large supply of saws, including metal-cutting circular saws, hacksaw frames and blades, files, ice saws, and torches. The certificate is signed by Rear Admiral Richard E. Byrd, and James I. Bush, chairman of the expedition.

"High-Test Cast Iron" is the title of a leaflet published by the Vulcan Metal Process Corpn., Muncie, Ind. It describes the Llewellyn Jones method of making this grade of iron having a low carbon content. The description includes an illustration of the special apparatus used with the cupola to produce this material.

Fig. 5. Corner weld, similar to Fig. 3, which has been hammered flat and then twisted

Fig. 6. Butt weld on No. 22 gage metal, twisted through 1080 deg.



Machine for Testing Running Qualities of Gears

THE Gleason Works, Rochester, N. Y., has brought out a new machine designed to test the running qualities of spur gears up to 14½-in. pitch diameter. The machine can be used for testing cluster gears as well as gears with an integral shank, also helical, herringbone and internal spur gears.

Gears are tested by running them together in pairs or by running several gears successively with a given test pinion. They can be tested with, as well as without, load; the load is applied manually by a brake operating on the driven spindle.

The machine is rigidly built. The frame is made in one piece and is of heavy section with liberal ribbing. The work-heads are adjustable horizontally on the frame by means of a handwheel and leadscrew graduated in 0.001 in. They are mounted so that the spindles are in exactly the same plane and parallel. Both heads are locked to the frame at front and rear by separate clamps which operate with equal tension from a single lever. The ways have rectangular gibs for taking up wear, and guards are provided to protect them from red lead and dust.

The spindles are mounted in the heads on matched ball bearings of improved type. The noses of the spindles are heat treated and the taper bores are ground with the spindles in place on their own bearings, thus assuring concentricity between the spindle bearing and bore. Sight glasses facilitate maintaining proper oil level. Oil for the spindle bearings is filtered through special oil cups cast integral with the heads.

An outboard support for gears having a long integral shank is furnished. This support bolts directly to the frame, as illustrated; an overarm type of support can be furnished if desired. The spindles are driven by a 5-hp. motor mounted in the machine base, a variable speed 300 to 1200-r.p.m. motor being recommended. If it is desired to run these gears together with a mild abrasive to remove the slight roughness caused by heat treatment, guards, pump, sump and motor can be furnished as extra equipment.

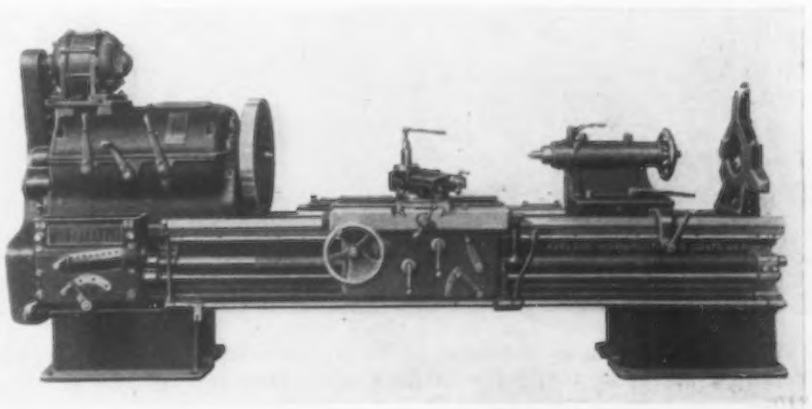
Floor space of 61½ x 77 in. is occupied by the machine. The net weight is 4000 lb.

Heavy-Duty 12-Speed Lathe Improved

SEVERAL improvements have been introduced in lathes made by the Axelson Mfg. Co., Los Angeles, particularly the heavy-duty 12-speed machine. This lathe was developed primarily for heavy-duty work, particularly in shops handling large cuts, such as oil well drilling bits, oil well reamers and machining of large units.

Three levers in front of the head-stock afford quick selection of spindle speeds. Starting, stopping and reversing control levers are located in close relation one to another, to permit fast and safe operation. One control lever is located at the head-stock, while the other travels with the carriage.

An improved quick-change gear box provides 45 instantaneous changes by the simple manipulation of two levers for feed screw regulation and control. The index plate is prominently located so that the operator may obtain the desired setting for thread or feed at a glance, and all changes may be made while the lathe is operating.

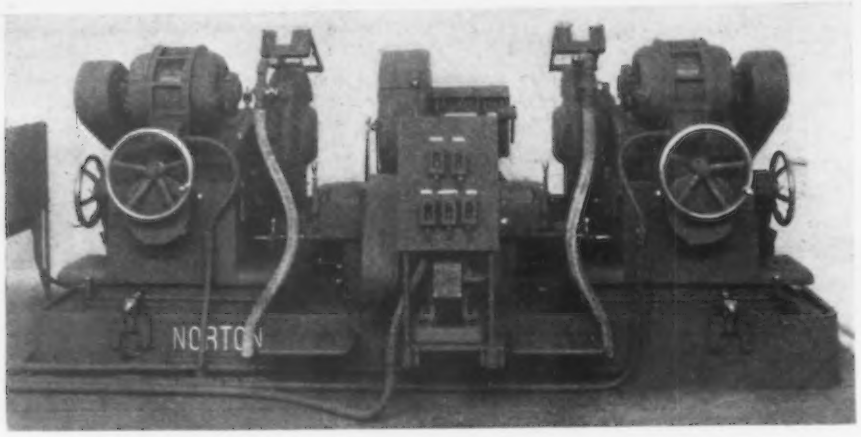


Indicating Pyrometer Controller

AN indicating pyrometer controller made by the Brown Instrument Co., Philadelphia, can be supplied as an automatic control pyrometer, resistance thermometer, tachometer, or CO_2 meter. Outstanding advantages claimed for this instrument are:

Reading is observed directly on a 6-in. scale. Index on scale for setting to exact control point. Control point instantly and easily adjustable. All wiring terminals and motor are inclosed. No danger when used in the presence of explosive or inflammable gases. Mercury switches up to 30 amp. capacity, eliminating the necessity of relay equipment; make-and-break occurs in sealed glass tube; no danger of spark causing explosion. Suitable for "on and off" or "three position" control through switches, valves, dampers, etc. Available with patented safety device which opens furnace circuit if thermocouple or wiring fails, preventing burning out furnace. High internal resistance, insuring accuracy. Automatic internal compensation, eliminating cold-junction errors when instrument is supplied as a pyrometer. Simplicity and ruggedness insures minimum of attention.

The control mechanism of Model 801 combines the basic principle of the Brown automatic control recorder, with the new feature of mercury contacts for breaking high currents.



Improved Carwheel Grinding Machine Employs Five Motors

THE new carwheel grinder recently placed on the market by the Norton Co., Worcester, Mass., is equipped to grind carwheels up to 44 in. in diameter and engine and truck wheels up to 36 in. Wheels 20 in. in diameter are the smallest that can be ground. Only standard 4 ft. 8½-in. gage wheel mountings are accommodated.

This machine replaces the company's previous model and, as before, the method of grinding is in accordance with the recommendations of the A.R.A. The wheels are ground true and concentric while revolving on their own journals. New wheels are ground to assure concentricity and smooth running, and wheels that have been in service are ground to remove flat spots.

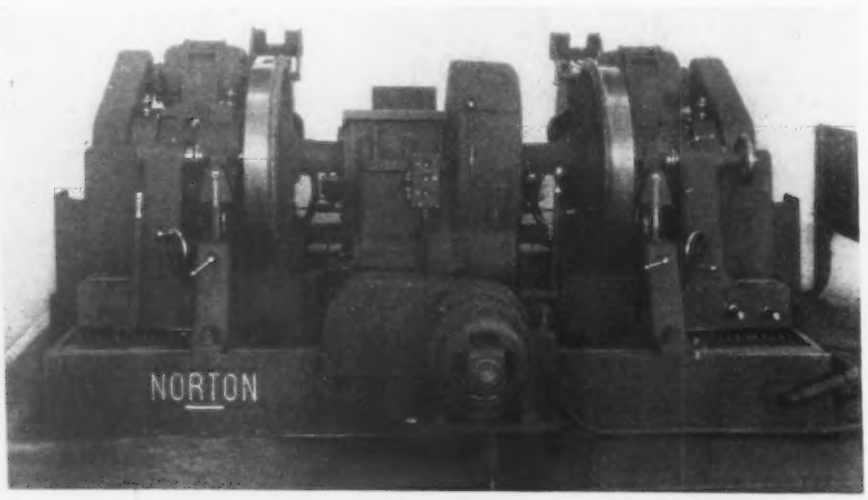
Arrangement of the work supports is optional. Those shown in the illustration are for standard axles with journals 3 to 9 in. in diameter. The supports are adjustable for height by means of convenient handwheels. End-wise shifting of the axle is prevented by adjustable ball thrusts. When required, work supports for ball or roller bearing axles can be supplied.

Two complete grinding wheel units are employed, one for each of the car wheels. These units are motor driven and individually controlled. The grinding wheel slides rest on wide ways, one flat and one Vee. Handwheels on ball bearing mounted feed screws operate the feed of the grinding wheels, and handwheels are provided on the sides of the machine for alining the grinding wheels in correct relation to the work. Each slide is independently reciprocated by power ⅝ to 1⅛ in., thus providing automatic traversing of the grinding wheel to assure better and more even wheel wear and increase production. Two traverse or reciprocating speeds are available.

Grinding wheels are dressed by means of standard dressing tools, supported by brackets attached to the wheel guards and may be swung out of the way while grinding. The grinding wheel spindles are mounted in pre-loaded ball bearings. Grinding wheels are mounted on the tapered ends of the spindles, the standard size of wheel being 24 x 2¾ x 5 in. although guards to take wheels up to 4 in. thick can be furnished. A gaging device is provided to assure both car wheels of the pair being of the same diameter when ground.

The five motors on this machine are controlled from push-button stations located conveniently for the operator. An auxiliary push-button station is also provided on the loading or work side of the machine for starting, stopping or jogging the work drive while loading or unloading. The motors used are: two 25-hp. wheel-drive motors; one 10-hp. work-drive motor; one 3-hp. wheel-slide reciprocating drive motor; and one 1½-hp. lubricating pump motor.

Floor space occupied is 13 ft. 8 in. by 11 ft. 5 in.; the net weight with motors, is approximately 35,000 lb.



The operating side of the new 44-in. motor-driven carwheel grinder is shown at the top of page while the loading side of the machine, with carwheels in place, is shown above

Swiveling Flange Joint for Pipe Lines

A NEW type of flanged joint has been developed for use in connection with welded pipe lines, where such a joint is required for insertion of valves and of fittings for taking off outlets. Known as the Merco swivel flange, it is said to possess fully

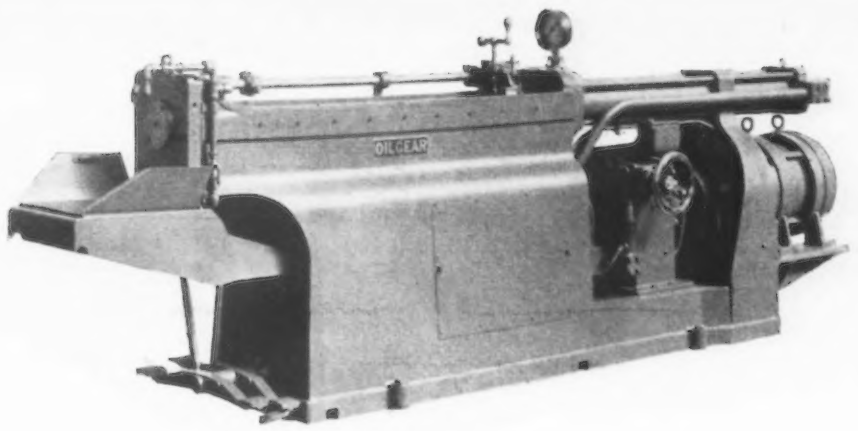
the inherent flexibility of the Vanstone type of flange, plus the strength of an ordinary butt-welded flange.

It consists of a drop-forged steel flange, fitted to a drop-forged tapered nipple on which the flange may be rotated, permitting alinement of bolts, etc. The tapered nipple is forged from a solid steel billet and the finished product incorporates a thickness much greater than pipe at the base of the nipple, where highest stress occurs.

Being formed completely at the proper forging temperature, possibility of a fracture of the metal is minimized. The manufacturers state that by forging from a solid billet sufficient heat is stored up in the steel to permit operation being finished at the correct forging temperature.

This product is being made by the Merco Nordstrom Valve Co., 343 Sansome Street, San Francisco. The manufacturers are arranging production to make available all sizes from 1½ in. to 10 in., and specifications are to meet the American standards in strength requirements.

New Oilgear Broaching Machine



SMALL and medium size parts may be broached at high speed on the new type XL-12 horizontal broaching machine announced by the Oilgear Co., Milwaukee. Sturdy construction, convenient control, adjustable pulling speed, high return speed and close limits for finished parts were keynotes in developing this design.

An Oilgear type WSG-6 variable-delivery pump is mounted in the frame as an integral part of the machine. The pump is operated at a maximum speed of 860 r.p.m., has a maximum delivery of 4800 cu. in. per min. at a working pressure of 1000 lb. per sq. in. and a peak pressure of 1250 lb. per sq. in.

A smooth and pulsationless flow of oil is delivered under pressure in direct proportion to the pull required for broaching; oil displacement is practically positive against any resistance up to the maximum capacity. The pump, machine, tools and the work are protected against overload by automatically operated release and by-pass valves. Other features of this pump include simplicity and compactness, pressure lubrication of working parts, roller bearing mounting of heavy parts, and accessibility of all members. Control of the amount of oil delivered and the speed of the draw-head is by means of a hand-wheel on the pump.

The control mechanism consists of a handlever and double foot pedal. When using the foot pedal to start and reverse the draw-head, the operator has both hands free to serve the machine. The draw-head can be stopped and started instantly at any point of its stroke. Two adjustable cams on the control rod automatically stop the draw-head at the end of the stroke. The stroke can be changed conveniently to suit the work or the tools. When the automatic stops are set, the length of the stroke remains fixed without overrunning. The control mechanism operates a combination valve which reverses the flow of oil from the pump to the cylinder. The automatic unloading valve which opens and stops the draw-head motion as soon as the machine reaches the maximum capacity is an integral part of the control valve.

The draw-head, which is screwed to the ram and is guided by bronze liners on large flat steel ways, can be adjusted 1⅜ in. above or below the center-line of the ram. The cylinder is of seamless steel tubing and is accurately bored and honed. The frame provides a large reservoir for coolant.

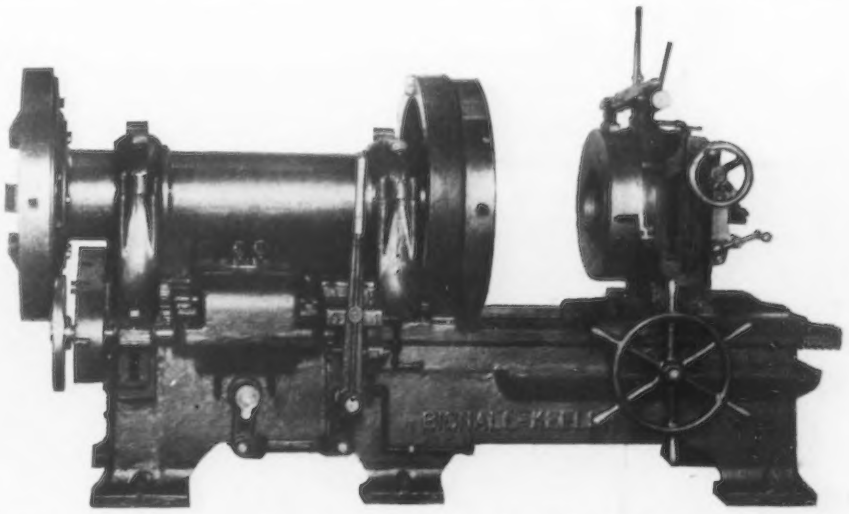
Normal pulling capacity of the machine is 12,000 lb. and the peak capacity is 15,000 lb. The pulling speed is variable from 4 to 33 ft. per min., while the maximum return speed is 70 ft. per min. The maximum stroke is 48 in. Special equipment includes a sliding broach support with leg, broach clamping fixture and counter shaft for belt drive. For motor drive a 10-hp. 860-r.p.m. motor is employed. Floor space occupied by the machine is 25 by 147 in.; the net weight is approximately 3600 lb.

Duplex Machine Cuts and Threads 2½ to 8¼-In. Pipe and Casing

THE Bignall & Keeler Machine Works of the N. O. Nelson Mfg. Co., Edwardsville, Ill., has brought out the duplex pipe machine illustrated for cutting and threading pipe and casing ranging from 2½ to 8¼ in. in diameter. This machine, designated as the No. 8, is equipped with a Peerless sliding die head having expanding dies. Screw adjustment is provided for accurate setting of the dies, and there is a positive locking arrangement which takes all strain from the adjusting screw and insures duplicate threads.

Eight changes of speed are obtainable through the gear box, the lower half of which is part of the bed casting. Gears in the gear box are of steel, have a wide face and run in oil. A two-way positive clutch has both fast and slow positions; it provides quick start and stop for the machine and also enables the operator to shift quickly to the higher speeds for cutting-off operations on large pipe.

A three-jaw independent chuck is mounted on each end of the arbor. Each jaw has a tool steel gripper



Eight different speeds are obtainable through the gear box. The clutch has both fast and slow positions

which can be readily removed for sharpening.

The rear chuck has special flange grippers, a convenience in making up flanged fittings. Self-centering V-jaws with hardened faces are provided for steadying pipe when cutting off, reaming and beveling.

The die head slides to one side for changing dies and when putting collars through to the cut-off tool. The head can be arranged for extra wide dies, either 3 7/16 or 4 7/16 in. The machine has ample power for cutting long tapered threads to the A. P. I. or any other standard at one pass. Landis die heads can be substituted for the Peerless head if desired.

The machine can be furnished for belt or motor drive. It occupies floor space of 57 x 110 in. and weighs approximately 7500 lb.

Massive Billet Chipping Machine

A MACHINE for chipping blooms or billets, incorporating several novel features of design and construction, has been developed by the Bonnot Co., Canton, Ohio. It can be used to chip billets of any cross-section, and any length up to 30 ft., without necessity for any adjustments. Two prominent features of the machine are its simplicity, and the speed with which it works.

Since six motions of the cutting head are possible with one lever, it is possible to remove flaws of any character or direction, without waste motion, it is said. As a result one man, not necessarily skilled, can chip an average billet in about half an hour. The machine has overall length of 23 ft., overall width of 6 ft., and overall height of 10 ft. The weight installed is 27 tons.

Essentially the machine consists of two parts, a fixed base and a movable main carriage, the latter carrying the cutter head and its driving and travel motors and gears. The bed is equipped with an adjustable manipulator chuck operated by compressed air. Billets can be turned through either 90 deg. or 45 deg. as desired, thus eliminating necessity for manual handling.

Carriage travel, which provides the forward motion of the cutter head, is obtained by means of a lead screw driven by a 25-hp. motor through a worm reduction gear. The worm shaft of the gear is mounted in anti-friction bearings, a Timken bearing being used at one end and a straight roller bearing at the other. The screw is mounted in Timken bearings, that at the drive end being a heavy-duty thrust bearing.

Motion is transmitted to the carriage by a heavy bronze nut on the travel screw, which engages with two lugs, one on either side, bolted to the carriage. In-and-out motion of the cutter head is provided by a pilot wheel which actuates a rack and pinion gear on a stationary rod connected to the cutter spindle by a cross link. This is the only manual operation. The cutter head can be moved out a total of 14 in.

The tools are 2 x 2-in., including a backing of hardened steel. Removal for grinding, and replacement, are simple matters, and a gage makes it easy to set the tools for concentricity. Control of all motor-driven motions, carriage forward and reverse, cutter travel up and down, and cutter rotation, are all centralized in a single handle, so located that the operator has a clear view of the work.

Since there is no necessity for reversal after every short cut, there is a considerable saving in time, especially in removing diagonal or transverse flaws. In removing longitudinal flaws, the carriage is moved with the cutter stationary, giving a simple planer action.

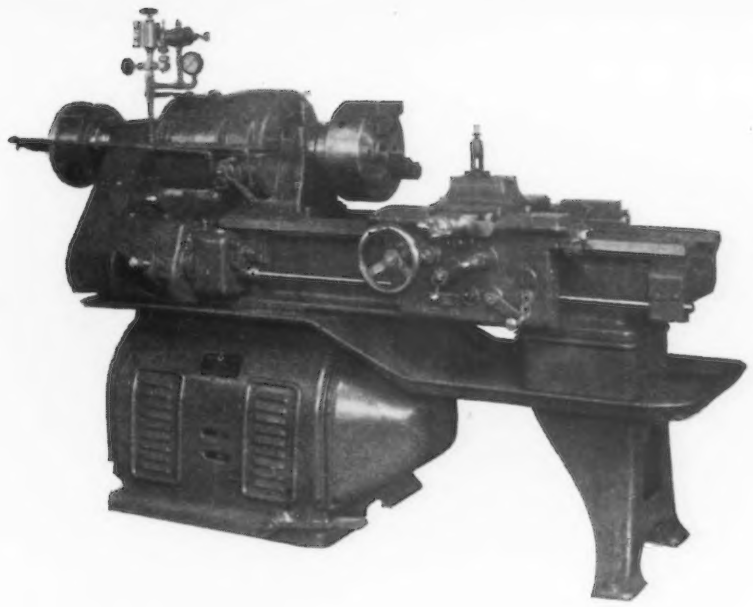
CLOSE-UP of main carriage, showing control handle at right, cutter pilot wheel and arrangement of tools in cutter head

Gage for 7/32-In. and Smaller Wire

THE Krupp Mikrotast gage illustrated, for gaging fine wire up to 7/32-in. in diameter, is being marketed in the United States by the Coats Machine Tool Co., 110 West Fortieth Street, New York.

The gage is set by loosening the lower locknut and raising the lower contact anvil by turning the upper knurled disk to the left until the gap between the two anvils corresponds approximately to the diameter of the master wire. The master wire is then inserted and the upper knurled disk is turned until the indicating pointer stands in the center of the scale. The locknut is then turned to secure this exact setting and the red tolerance markers are adjusted right and left of this setting in accordance with the permissible tolerances. For gaging thin sheets the back-stop may be removed.

The fan-shape Mikrotast operates on the knife-edge principle. It is furnished graduated in 40 divisions of 0.00005 in. or 50 divisions of either 0.0001 in., 0.0002 in., 0.0005 in. and 0.001 in.



Lathes with Speeds Up to 3000 R. P. M.

THE Monarch Machine Tool Co., Sidney, Ohio, has brought out a 16-in. x 6-ft. lathe featuring spindle speeds up to 3000 r.p.m. The machine is the company's model AA lathe designed for self-contained individual motor drive, with the motor mounted in the base and driving the spindle through multiple V-belt. The drive is not up through the bed and inside the headstock, but is outside of the rear spindle bearing, an arrangement which facilitates replacing the belting, from the outside, when necessary. Either direct-current variable-speed motor or alternating-current multi-speed motor can be mounted in the base, which is provided with louvers for ventilation. The machine shown is equipped with a 7½-hp. variable-speed d.c. motor.

On this particular lathe the lead-screw and screw-cutting mechanism have been omitted, which permits driving from the spindle to the gear box through V-belt, a type of drive conducive to quietness. The main spindle, as well as gear box shafts, are mounted in Timken roller bearings. The carriage and apron are of standard construction incorporating ball eccentric levers for controlling apron friction feeds. The bed is made of material containing 2.60 to 2.70 per cent carbon, and having a tensile strength of 55,000 to 60,000 lb. per sq. in.

Satisfactory results are said to have been obtained with tungsten-carbide tools at speeds as high as 1620 r.p.m.

Crane for Working in Close Clearances

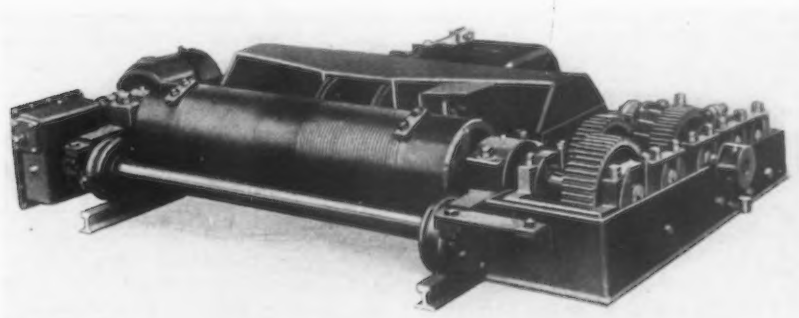
LOW headroom, without sacrifice of accessibility or ruggedness, is an outstanding feature of a new "Hi-Lo" crane now in production by the Whiting Corporation, Harvey, Ill. The hoist gearing may readily be inspected by lifting a light-weight, welded steel housing. All gears are cut from cast steel and pinions are formed from forgings, wear being distributed over wide gear faces.

Besides taking minimum headroom, the 5-ton trolley will carry the hook horizontally to within 20¼ in. of the runway rail, and vertically within 23 in. of the high point of the crane, allowing 6 in. further lift for limit switch overtravel.

The mechanical brake is of the design standard with the Whiting Corpn. Solenoid brakes are furnished on the hoist and on the rack. All bearings are equipped with Hyatt roller bearings. Gears and gear shaft bearings operate in an oil bath. Bearings outside of the gear housing are lubricated by grease under high pressure.

The entire hoist gear train and housing may be lowered to the floor for inspection, by removing caps on the extended drum shaft. The drum likewise may be easily removed, as the drum shaft carries none of the weight of the trolley, being independent of axle.

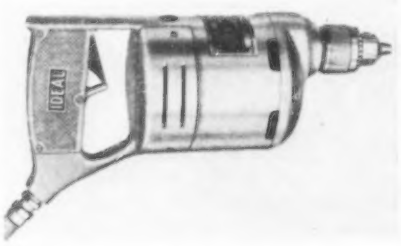
General specifications for the 5-ton capacity crane are: Trolley gage, 5 ft.; span, 25 ft. to 50 ft.; distance rail to top of trolley, 2 ft. 9 in. to 3 ft. 5 in.; runway rail to top of bridge rail, 16 in. to 24 in.; and wheel load, 9700 lb. to 14,000 lb. Specifications for the 10-ton crane are: Trolley gage, 5 ft.; span, 20 ft. to 40 ft.; distance, rail to top of trolley, 3 ft. to 3 ft. 5 in.; runway rail to top of bridge rail, 19 in. to 24 in.; and wheel load, 15,000 lb. to 17,500 lb.



Accessibility and ruggedness are features of this high-lift, low headroom crane

Compact Electric Drill

COMPACTNESS is a feature of the type LO ¼-in. standard duty drill recently added to the line of the Schauer Machine Co., Cincinnati.



The tool measures 10½ in. overall, weighs only 5½ lb. and is equipped with a special universal motor. The armature shaft and the chuck shaft are mounted on New Departure sealed-type ball bearings, the method of mounting which makes for a much shorter drill, an advantage in close corner work.

A removable plate on the housing permits ready inspection and adjustment of the commutator and brushes, while a removable plate on the handle permits inspection of the switch connections. Trigger switch for convenient operation is mounted in a grip type handle. The cable is protected by a special clamp and spring, which eliminates any strain on the terminals. Equipment includes a three-jaw key chuck.

M. A. Hanna Co., Cleveland, has declared the regular quarterly dividend of $1.75 on its $7 cumulative preferred stock, payable Dec. 20 to stockholders of record Dec. 5.

Scrap Dealers Consider Nation-Wide Disposal of Worn Out Automobiles

THE inauguration of a nationwide movement to dispose of worn-out automobiles in the hands of dealers and convert them into scrap through the cooperative efforts of automobile dealers and scrap yards was discussed at a special conference of the National Advisory Council of the Institute of Scrap Iron and Steel, Inc., at a two-day session held at the Hotel Cleveland, Cleveland, Oct. 29 and 30. The appointment of a committee was authorized to make a thorough study of the subject with a view to determining a practical solution of the problem.

Scrap dealers all over the country are taking a great deal of interest in the matter, according to the statement of Benjamin Schwartz, director general of the institute, at the opening of the session, and numerous requests have come to him from members for information on the handling of automobiles for scrap. The meeting was attended by a representative of the General Motors Corpn., which is showing considerable interest in the development of cooperative plans for getting rid of automobiles that have outlived their usefulness to the extent that they are a menace to traffic on the highways and a hindrance to the sale of used cars that are still serviceable.

Mr. Schwartz predicted that a tremendous business would be created in scrapping automobiles. Scrap dealers, he said, have the capital, experience and machinery to handle this work and would gladly take it up if it will prove profitable. If the scrapping is handled by dealers, there should be a steady flow of old automobiles that would allow for mass operations. The General Motors Corpn., he said, had tentatively arrived at conclusions that the most practical way to handle the scrapping of cars is through the dealers. He believed the institute could work out methods of handling the matter regionally or through a national organization.

Cooperative plans for scrapping automobiles recently adopted by the Cleveland Automobile Manufacturers and Dealers Association were outlined at length by Herbert Buckman, manager of that association. This plan has been in operation for six months and appears to be working successfully. Under the cooperative plan used in Cleveland, a company known as the Cleveland Guarantee Auto Scrapping Co., which is cooperating with the Cleveland dealers' association, was organized and has on its board of directors three representatives of the dealers' association. The cars are being scrapped by the A. Shaw Co., a Cleveland scrap dealer, through arrangements made with the scrapping company. One of the regulations is that all parts of an automobile must be sold as scrap, thus preventing the disposal of parts to dealers in used parts. The three directors representing the automotive industry on the board of the scrapping company fix the price to be paid to dealers for old cars, the salaries of the management staff and adjust the dealers' percentage of profits.

Dealers contract to sell all junked cars at 25c. a 100 lb. The dealers' association receives $1 a car from the scrapping company and to the fund so derived is added 25 per cent of the net profits of the scrapping company after deduction of 6 per cent return on invested capital. This fund is to be distributed to the dealers once a year in proportion to the tonnage of old cars turned in. If the cars come from out of town dealers, the scrapping company prepays the towing charge, which is eventually deducted from the dealers' share in profits.

Obsolescence This Year 3,000,000 Cars

The number of old automobiles available to be retired this year is 3,000,000, according to figures prepared by the National Automobile Chamber of Commerce, and Mr. Buckman predicted that this would be increased to 4,000,000 a year within five years. In 1913 less than 200,000 cars were scrapped. Some plan must be made, he said, for the systematic retirement of old cars. In past years no one has shown much concern about the final disposition of these cars. However, he referred to the fact that motor car manufacturers are cooperating in safety campaigns, in working with police authorities in putting worn-out cars on the scrap heap and have inaugurated plans to assist dealers in removing decrepit cars from the highway by paying a bounty for these cars.

Concerns engaged in wrecking cars, Mr. Buckman said, have been guilty of practices inimical to the interests of scrap dealers and automobile dealers. These practices include resale of junked cars, and he said that old automobiles have made as many as 14 trips between dealers and wrecking yards, having been traded in that number of times. These wreckers, he said, have been delinquent in connection with certain phases of sorting scrap and have given automobile scrap a bad name.

It would be an advantage to the automobile dealer, in Mr. Buckman's opinion, for well-equipped scrap yards to handle the old automobiles. Dealers would obtain the advantages of good scrap yard management, including economical scrapping of the metal, established outlets for the scrap, good volume of tonnage with direct mill contacts and sufficient capital to hold scrap for favorable prices.

That the scrap dealers are deeply interested in the subject was indicated by considerable discussion and asking of questions. Some felt that the price paid by the scrap yard under the Cleveland arrangement is too high. It was pointed out that the scrap yard is paying $6 a ton for the old cars and, assuming that the scrap marketed as No. 2 heavy melting steel brings $9 a ton, there is left only $3 a ton for profit. However, it was brought out that if the price paid is too high, the contract can be revised and that if it is not mutually profitable to the dealer and scrap yard the plan can be abandoned. Mention was made that the Ford Motor Co. pays $20 for old cars, but this is only for delivery in Detroit and the Ford company salvages parts.

Mr. Schwartz, in commenting on the plan, said that there is still danger that some dealers might turn old automobiles over to wrecking companies for higher prices than they would receive from the scrap yard. It was stated that the A. Shaw Co., under the plan, is now scrapping 35 automobiles a day. It was estimated that 25,000 automobiles a year are now retired

from service in Cleveland. The visiting scrap dealers spent part of one afternoon in visiting the Shaw yard.

The meetings, aside from the session devoted to the discussion of the scrapping of automobiles, were taken up with reports of committees and the report of Mr. Schwartz as director general.

Complaints Being Investigated

The trade relations committee reported that it had investigated 48 complaints since the organization of the institute. It had issued eight warnings, two members had been expelled, four complaints had been withdrawn, 23 are still pending and none has been referred to the Federal Trade Commission. It also investigated 36 miscellaneous complaints not covered by the code of business practices. These were mostly against consumers, producers and railroads. The committee stated it had done much toward eliminating future complaints of a similar character.

The arbitration bureau reported that it had considered 55 cases involving over 100 members. It recommended broadening the scope of the code to include uniform sales and purchase contracts and an arbitration clause.

Mr. Schwartz stated that the National Association of Purchasing Agents had been asked to provide proper machinery for conducting arbitration with the institute and he believed the purchasing agents would comply with this request. He pointed out that this would be of advantage in view of the fact that most of the mills belong to the purchasing agents' association. At present, if there is any arbitration between dealers and mills it is voluntary on the part of the latter.

Mr. Schwartz stated that the institute is now providing its members with additional service by the recent establishment of a credit bureau. This is for the protection of the members. The institute, he said, has no intention of establishing a blacklist. The suggestion was made that members be obligated to send in information to make the credit bureau more efficient. This would be the interchange of ledger experience.

The report of the research committee, submitted by E. G. Howell, stated that the committee has created the first authentic data and literature for the scrap iron industry. Statistics covering production and consumption have been gathered, and the committee stated that this information will be invaluable in any program to eliminate waste in the industry, to improve the channels of distribution and to provide a continuous flow of economic scrap for the consumer.

Urges Proper Sorting of Alloy Scrap

The iron and steel scrap committee of the National Association of Purchasing Agents, the committee reported, has agreed to cooperate with the institute to urge upon producers the necessity for proper sorting of alloy scrap at its source, and it hoped that with the cooperation of this committee and other organizations progress would be made to solve the problem of alloy steel scrap. The scrap industry, the committee stated, has been working in the dark for a generation and the importance of facts and statistics that are now being gathered will be appreciated later.

There was some discussion of a proposal to approve the movement for extension of waterways, which will be taken up at a national conference in St. Louis this month. Mr. Schwartz said that dealers are entitled to wider markets to ship and draw scrap from and he believed that development of waterways would be beneficial to the scrap industry. However, there was some objection to taking any action at the present time with a view to approving the development of new means of transportation. One argument against taking action on extension of waterways was that railroads are heavy buyers of steel. It was brought out in the discussion that the proposal was made recently to ship scrap from Cincinnati to Pittsburgh on steel-carrying barges that were going back empty, but it was found that transportation costs would be $3 a ton for vessel rate and $1 a ton handling charge at each end compared with a $4.41 rail rate.

It was decided to hold the next annual meeting in Cleveland, March 10, 11 and 12.

The conference closed with a banquet attended by the Cleveland-Detroit chapter of the institute. This was presided over by Morris Speer, president of the Cleveland-Detroit chapter. The speakers included Mr. Speer, Samuel N. Summer, Columbus, president of the institute, Mr. Schwartz and W. S. Doxsey, editor of *Daily Metal Trade*.

Bearings and Their Lubrication

"BEARINGS and Their Lubrication" was the subject of an address by L. H. Nielsen of the technical staff of the Vacuum Oil Co., before the Hartford, Conn., chapter of the American Society for Steel Treating, Oct. 14.

Mr. Nielsen gave a thorough review of the principles and methods of lubrication, both of plain bearings and of anti-friction bearings. He dealt with the principle of the lubricating oil film and wedge, the formation and maintenance of the lubricating oil film, and the methods of application and the selection of proper lubricants.

Among other things he stressed the importance of chamfering the oil groove of a plain bearing in the direction of the rotation of the shaft. Oil grooves, he said, should be placed about 30 to 45 deg. in front of the point of greatest pressure and the number of these grooves should be as small as possible. Criss cross and fancy oil grooves tend to lead the oil from the point at which it is needed and also they reduce the effective area of bearing surface. As the pressure increases, more points of application of the lubricant must be provided.

Roller bearings are lubricated, said the speaker, to protect the high polish as well as to lubricate the rollers. Only enough lubricant is required to reach the level of one-half the height of the ball or roller at the bottom of the bearings. Tapered bearings act as centrifugal pumps. The large end should be placed on the inside to pump the oil away from the packing, and a groove should be provided to return the oil to the small end of the bearing. In order to minimize fluid friction, the oil used should possess the lightest body that will maintain with safety a complete film under existing conditions of load, speed and temperature.

After the address, A. M. Drake, assistant master mechanic, Pratt & Whitney Co., who acted as technical chairman of the meeting, led an illuminating discussion on the applications of various lubricants. The following points were brought out in the discussion:

Gumming of oils is due to the presence of animal oils or undissolved hydrocarbons which are oxidized by high temperature and by churning. Watches require porpoise oil, which sells for $75 per gallon, as it is the only lubricant which will give a satisfactory low pour test, absence from creep and low oxidizing value. Air compressors require very little oil for the cylinder walls and light vaporizing oil will make explosive mixtures with the compressed air.

A short talk on the National Metal Congress was made by H. J. Fischbeck, chairman of the chapter, and the announcement was made that A. H. d'Arcambal had been nominated as vice-president of the national society. Mr. d'Arcambal is a member of the Hartford chapter.

The next meeting of the chapter will be held Nov. 11, at which Robert M. Keeney of the Connecticut Light & Power Co. will speak on the "Source of Heat for Heat Treatment."

Change for Open-Hearth Meeting

A change has been made in both the date and place for the meeting of the Open-Hearth Committee of the American Institute of Mining and Metallurgical Engineers. Instead of meeting Nov. 19 and 20 in Pittsburgh, as previously announced, the gathering will take place at the Hotel Cleveland, Cleveland, on Nov. 20 and 21. On the afternoon of Nov. 21 the members of the conference will visit the Corrigan-McKinney steel plant.

October Iron Output Down 8 Per Cent from September—Net Loss 12 Stacks

ANOTHER sharp drop in pig iron output occurred in October. Actual returns by wire on Nov. 3 from every blast furnace blowing during the month show that the daily rate last month at 69,831 gross tons was about 8 per cent under that for September. There was also again a large net loss in active furnaces.

Production of coke pig iron in October was 2,164,768 gross tons or 69,831 tons per day for the 31 days which contrasts with 2,276,770 tons or 75,890 tons per day for the 30 days in September. The loss in daily rate for October was therefore 6059 tons or 8 per cent. The corresponding loss in September was 6.8 per cent with a loss in August of 4.3 per cent and in July of 13 per cent.

The daily rate for October of 69,831 tons is the smallest since September, 1924, when it was 68,442 tons per day. The most recent smaller daily rate for October was 40,215 tons in 1921.

Comparisons for 10 Months

For the first 10 months this year the total output was 27,866,308 tons. This compares with 25,637,027 tons to Nov. 1, 1924, as the next most recent smaller for that period. It compares also with 36,267,442 tons for the first 10 months of 1929 and with 31,165,435 tons for the same period in 1928.

Net Loss of 12 Furnaces

Sixteen furnaces were blown out or banked during October with 4 blown in, a net loss of 12 for the month. This compares with a net loss of 16

Daily Average Production of Coke Pig Iron in the United States by Months Since Jan. 1, 1926—Gross Tons

	1926	1927	1928	1929	1930
Jan.	106,974	100,123	92,573	111,044	91,209
Feb.	104,408	105,024	100,004	114,507	101,390
Mar.	111,032	112,366	103,215	119,822	104,715
Apr.	115,004	114,074	106,183	122,087	106,062
May	112,304	109,385	105,931	125,745	104,283
June	107,844	102,988	102,733	123,908	97,804
½ year	109,660	107,351	101,763	119,564	100,891
July	103,978	95,199	99,091	122,100	85,146
Aug.	103,241	95,073	101,180	121,151	81,417
Sept.	104,543	92,498	102,077	116,585	75,890
Oct.	107,553	89,810	108,832	115,745	69,831
Nov.	107,890	88,279	110,084	106,047	.....
Dec.	99,712	86,960	108,705	91,513	.....
Year	107,043	99,266	103,382	115,851	.....

Pig Iron Production by Districts, Gross Tons

	Oct. (31 days)	Sept. (30 days)	Aug. (31 days)	July (31 days)
New York and Mass.	128,710	132,873	157,034	162,328
Lehigh Valley	72,938	66,448	70,491	67,348
Schuylkill Valley	25,340	25,664	29,501	44,312
Lower Susq. and Lebanon Valley	18,012	19,427	18,579	19,426
Pittsburgh district	530,689	554,662	581,528	605,414
Shenango Valley	54,750	64,584	68,735	70,917
Western Pennsylvania	53,952	60,241	65,850	61,886
Maryland, Va. and Ky.	83,621	91,066	98,214	93,697
Wheeling district	128,486	132,627	145,330	142,492
Mahoning Valley	157,775	186,436	224,891	246,176
Central and North'n Ohio	198,479	200,266	227,826	258,435
Southern Ohio	33,251	42,658	43,851	47,076
Illinois and Indiana	424,329	427,819	486,334	507,822
Mich., Minn., Mo., Wis., Colo. and Utah	106,683	110,202	114,057	119,769
Alabama	147,753	161,797	191,700	192,002
Tennessee	.....	.....	.....	437
Total	2,164,768	2,276,770	2,523,921	2,639,537

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works Iron	Merchant Iron*	Total
October, 1929	93,644	22,101	115,745
November	83,276	22,771	106,047
December	68,152	23,361	91,513
January, 1930	71,447	19,762	91,209
February	81,580	19,810	101,390
March	83,900	20,815	104,715
April	85,489	20,573	106,062
May	84,310	19,973	104,283
June	77,883	19,921	97,804
July	66,949	18,197	85,146
August	64,857	16,560	81,417
September	62,342	13,548	75,890
October	57,788	12,043	69,831

*Includes pig iron made for the market by steel companies.

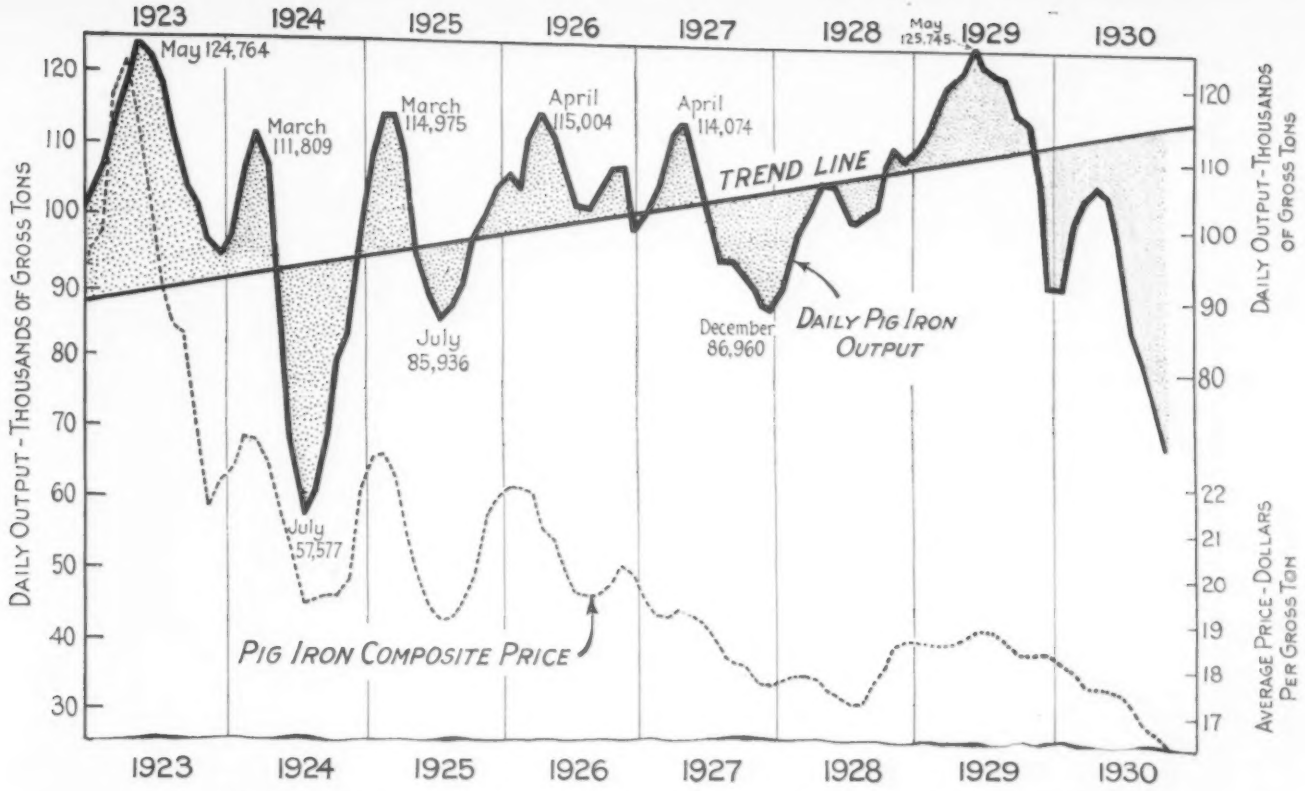
Coke Furnaces in Blast

Furnaces	Nov. 1 Number in Blast	Nov. 1 Rate of Operation	Oct. 1 Number in Blast	Oct. 1 Rate of Operation
New York:				
Buffalo	5	3,295	6	3,495
Other N. Y. and Mass.	2	710	2	800
New Jersey	0	....	0	....
Pennsylvania:				
Lehigh Valley	5	2,350	5	2,215
Schuylkill Valley	2	815	1	335
Susquehanna Valley	1	580	1	645
Ferromanganese	0	....	0	....
Lebanon Valley	0	....	0	....
Ferromanganese	0	....	0	....
Pittsburgh District	23	15,480	27	18,085
Ferromanganese	2	310	2	290
Shenango Valley	2	1,300	3	1,820
Western Pennsylvania	2	1,260	4	1,825
Ferromanganese	2	400	1	180
Maryland	3	2,305	4	2,720
Wheeling District	5	3,565	6	4,185
Ohio:				
Mahoning Valley	7	4,935	7	5,060
Central and Northern	10	5,980	11	6,670
Southern	3	840	4	1,420
Illinois and Indiana	19	13,900	19	14,960
Mich., Wis. and Minn.	4	2,110	5	2,700
Colo., Mo. and Utah	2	875	2	825
Ferromanganese	1	80	1	120
The South:				
Virginia	1	245	1	250
Kentucky	0	....	0	....
Alabama	10	4,630	11	4,925
Ferromanganese	0	....	0	....
Tennessee	0	....	0	....
Total	111	65,965	123	73,525

Production of Coke Pig Iron in United States by Months Beginning Jan. 1, 1928—Gross Tons

	1928	1929	1930
Jan.	2,869,761	3,444,370	2,827,464
Feb.	2,900,126	3,206,185	2,838,920
Mar.	3,199,674	3,714,473	3,246,171
Apr.	3,185,504	3,662,625	3,181,868
May	3,283,856	3,898,082	3,232,760
June	3,082,000	3,717,225	2,934,129
½ year	18,520,921	21,640,960	18,261,312
July	3,071,824	3,785,120	2,639,537
Aug.	3,136,570	3,755,680	2,523,921
Sept.	3,062,314	3,497,564	2,276,770
Oct.	3,373,806	3,588,118	2,164,768
10 months	31,165,435	36,267,442	27,866,308
Nov.	3,302,523	3,181,411	.....
Dec.	3,369,846	2,836,916	.....
Year*	37,837,804	42,285,769	.....

*These totals do not include charcoal pig iron. The 1929 production of this iron was 138,193 gross tons.



Daily production of pig iron is now proportionally about as much below needs as in July, 1924

Inclined line represents the gradually increasing theoretical needs of the country, ascertained by a balancing of the ups and downs in production. It shows an average yearly increase in consumption of about 1,275,000 *tons*

in September, 5 in August, 16 in July, and 20 in June. In the seven months since March there has been a net loss of 72 furnaces.

Operating Rate on Nov. 1

For the 111 furnaces active on Nov. 1, the operating rate is estimated at 65,965 tons per day. This compares with 73,525 tons per day for the 123 furnaces active on Oct. 1.

Of the 16 furnaces shut down during October, 7 were Steel Corporation stacks, 6 belonged to independent steel companies and 3 were merchant stacks. Of the 4 furnaces put in operation during October, 3 were independent steel company stacks and one belonged to the Steel Corporation. The net loss in steel-making furnaces for October was 9.

A sharp loss in steel-making iron was registered in October. The daily rate was 57,788 tons, a loss of 4554 tons per day. The loss in merchant iron from September was 1505 tons per day.

Furnace Changes in October

Among the furnaces blown in, or started up after temporarily banking during October, were one Swede furnace of the Alan Wood Steel Co. in the Schuylkill Valley, one Eliza furnace of the Jones & Laughlin Steel Corpn. in the Pittsburgh district; one Hubbard furnace of the Youngstown Sheet & Tube Co. in the Manhoning Valley; and one Gary furnace of the Illinois Steel Co. in Indiana.

The following furnaces were blown out or banked during October: Buffalo B furnace of the Hanna Furnace Co. in the Buffalo district; one Carrie, one Clairton and one Duquesne furnace of the Carnegie Steel Co.; one Donora furnace of the American Steel & Wire Co. and one Eliza furnace of the Jones & Laughlin Steel Cporn. in the Pittsburgh district; the Adrian furnace in western Pennsylvania; one furnace at the Sparrows Point plant of the Bethlehem Steel Corpn. in Maryland; the Jeannette furnace of the Youngstown Sheet & Tube Co. in the Mahoning Valley; one Newcastle furnace of the Carnegie Steel Co. in the Shenango Valley; one LaBelle furnace of the Wheeling Steel Corpn. in the Wheeling district; one River furnace of the Corrigan-McKinney Steel Co. in northern Ohio; the Hamilton furnace of the American Rolling Mill Co. in southern Ohio; one Gary furnace of the Illinois Steel Co. in Indiana; one Detroit furnace of the Hanna Furnace Co. in Michigan; and one Fairfield furnace of the Tennessee Coal, Iron & Railroad Co. in Alabama.

Production of Steel Companies for Own Use—Gross Tons

	Total Pig Iron Spiegel and Ferromanganese			Ferromanganese*		
	1928	1929	1930	1928	1929	1930
Jan.	2,155,133	2,651,416	2,214,875	22,298	28,208	27,260
Feb.	2,274,880	2,498,901	2,284,234	19,320	25,978	21,310
Mar.	2,588,158	2,959,295	2,600,980	27,912	24,978	23,345
Apr.	2,555,500	2,826,028	2,564,681	18,405	22,413	27,777
May	2,652,872	3,105,404	2,613,628	29,940	25,896	30,296
June	2,448,905	2,999,798	2,304,223	32,088	33,363	27,327
½ year	14,675,448	17,040,842	14,582,621	149,963	160,836	157,325
July	2,464,896	3,039,370	2,075,414	32,909	31,040	17,728
Aug.	2,561,904	3,065,874	2,010,572	24,583	28,461	20,909
Sept.	2,477,695	2,862,799	1,870,269	22,278	27,505	21,181
Oct.	2,729,589	2,902,960	1,791,421	23,939	31,108	24,480
10 months	24,909,532	28,911,845	22,330,297	253,672	278,950	241,623
Nov.	2,654,211	2,498,291	.....	29,773	31,866	.....
Dec.	2,647,863	2,112,704	.....	28,618	28,564	.....
Year	30,211,606	33,522,840	.....	312,063	339,380	.....

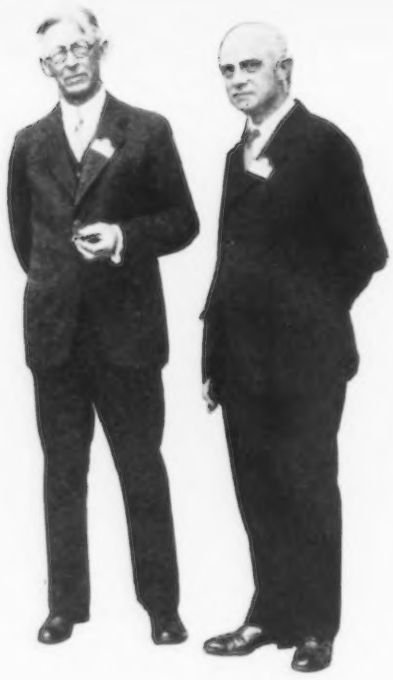
*Includes output of merchant furnaces.

Inland Steel Co., Chicago, has added a new roofing sheet to its line of products, "Perfect Drain" channel roofing. This roofing is said to provide a triple barrier against water. Made of Inland open-hearth steel, it is galvanized for durability. A descriptive folder is ready for distribution.

National Metal Trades Association will hold its next convention in Cincinnati in April, 1931.

Steel Constructors Look for Price Stabilization

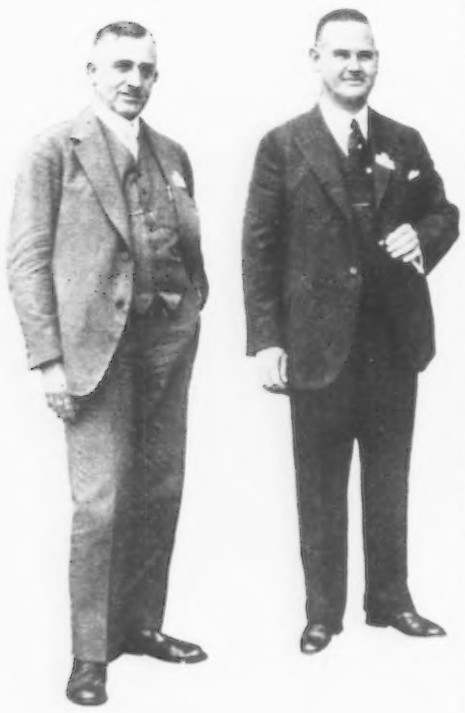
TAKE encouragement from address of President Farrell of United States Steel Corpn., who also emphasized the value of the industry association, saying: "Individual success and prosperity is based primarily upon the prosperity of the industry itself. No individual can possibly achieve permanent success if exclusive reliance is to be placed upon individual effort. . . . This is a time in which the constructive, cooperative effort of all is essential if the industry is to profit from its full possibilities during the years ahead."



Charles N. Fitts, New England Structural Co., Boston, president, and George E. J. Pistor, Hay Foundry & Iron Works, New York, treasurer of the American Institute of Steel Construction

A NEW high level was reached by the American Institute of Steel Construction in its annual meeting at Pinehurst, N. C., the four days beginning Oct. 28. Both papers and addresses came almost wholly from within the fabricating steel industry. There was active representation from practically all the important interests in steel bridge and building construction.

Among the high spots was an address by James A. Farrell, president of the United States Steel Corporation, and an outspoken hope, made particularly evident on the last day's session, of early stabilization of prices all along the line. This attitude was developed apparently in no small degree by Mr. Farrell's discussion of the immediate needs of the situation. The meeting as a whole was an acknowledgement in formal address and informal conversation of the achievements of the organization.



Otto von Halem, director of the Beratsungsstelle für Stahlverwendung, Düsseldorf, and J. C. Shryock, Chief Engineer, Belmont Iron Works, Philadelphia

Mr. Farrell Commends Institute's Work

Mr. Farrell recounted that the institute had become a national institution, that its help in the program of standardization, simplification and waste elimination had served the public as well as the industry in the reduction in costs of fabricated structures. He commended the work of the institute's staff of engineers for their achievements in promoting wider uses of structural steel and the efforts of the organization in promoting steel dams, steel frame buildings, the battle deck steel plate floor and the steel hangar. He touched on the importance of research in the problems of abatement of noise in construction, the use of alloy steels, the economic height of buildings and the demand for greater speed of erection occasioned by the consideration of the high cost of land.

He emphasized that there is a legitimate market for reinforced concrete and structural steel, that practicability and sound engineering can and should determine the limitations of each. He is for scrupulous care in all promotional effort, including advertising and selling, that claims made are free from misrepresentations or misleading statements.

The steel business, he added, was killed by pessimism and price cutting, and he repeated his statement at the recent meeting of the American Iron and Steel Institute respecting the great latent demand and the early coming of better business provided we have stabilization. He said he had noted signs of better demand in the last two weeks, also that the future held promise particularly for railroad bridges. Parenthetically he told of seeing 175-lb. steel rails rolled in South Chicago, presumably for steel mill use, but illustrative of the increased capabilities of steel rolling.

Touches on War Debts and Tariff

Mr. Farrell referred to his recent visit to Europe and pleased his audience by what was an indirect reply to a statement of the preceding speaker at the banquet, E. W. Beatty, president of the Canadian Pacific Railway, that many believe that world betterment hinges on America's remission of war debts. Europe's obsession, said Mr. Farrell, was this very thing: "They would have the people of the United States turn back to the Treasury the Liberty bonds they bought and cancel the debt." He told incidentally of his receiving at the hands of Francois de Wendel, head of the Comité des Forges of France, on the occasion of the centenary celebration of the Lorraine industry, of the gold medal of the Comité in recognition of 25 years of cooperation.

He also gave an answer to Mr. Beatty, and had apparently done likewise in Europe, respecting the reiterated charges that this country had erected a high tariff wall. "The 18 months' deliberations of Congress," he said, "had left steel unchanged, but took off the duties on by-products." He asked how far the average duty today of $3.27 a ton would go measured against existing high freight rates.

He recalled statements he had made before the American Iron and Steel Institute last May about the importance of the smaller consumers, who are educating new users and may de-

(*Continued on page* 1362)

Output Curve Still Above Composite Demand Line

BY LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

IN 1921, 1924 and 1927 the curve of ingot production, as adjusted by the New York University Bureau of Business Research, fell below the curve of indicated current requirements for steel. This fact strongly suggests that steel production had to be curtailed sufficiently to bring it into line with the activity of consuming industries before recovery could begin. The same curves now fail to show the relative positions reached at the bottom of past depressions.

Will these measurements again prove accurate, and will the old logic of adjusting supply to demand hold? If so, we are forced to conclude that the production curve will decline sufficiently to bring it below the "composite demand line."

Undoubtedly, there have been new factors: The large demand for line pipe may partly explain the level of the production curve this year. Doubtless, the radio industry has used considerable strip steel. Efforts to stimulate construction are now rampant. But demand for large-dimension pipe has been checked by seasonal and financial conditions, and it is unlikely that the artificial stimulation of building will be a large factor.

September saw a small recovery in the composite demand line. Railroad traffic, mining and oil activity, farm purchasing power and steel exports were lower; but gains in building activity and machine tool orders, and a less-than-seasonal decline in automobile production and in miscellaneous manufactures more than offset the decline. Even so, however, ingot production was at 93 per cent of the average for 1921-1927, compared with indicated requirements at about 86 per cent.

Conditions in Particular Industries

Nor does it seem likely that the September gain in the composite demand line is the beginning of a sustained recovery. It seems fair to say concerning the *automobile outlook* that the people of this country have enough cars to get along with for several months and they have not enough money to allow them to buy many new cars merely to gratify desires for a change.

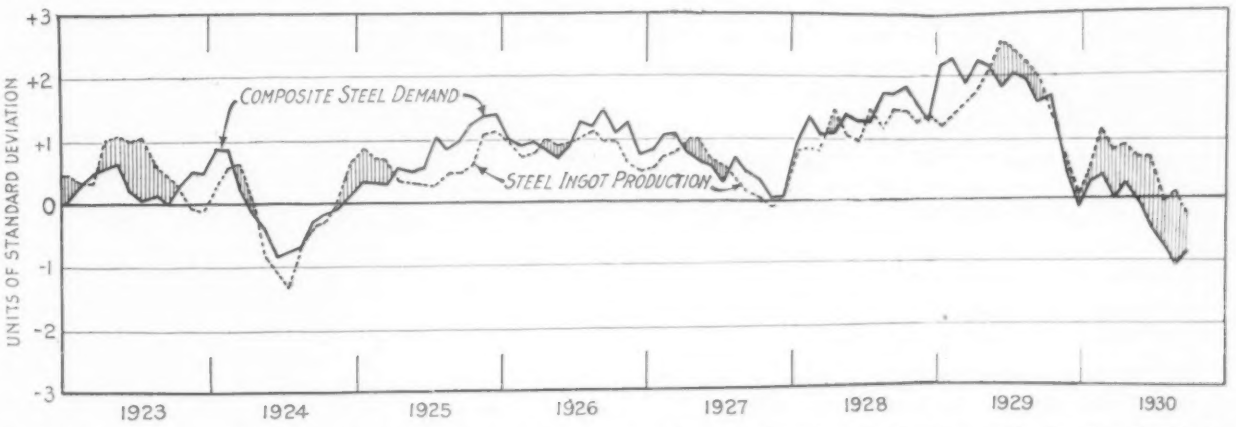
While *building activity* seems to be definitely at bottom levels, the supply of buildings is still so ample and there is so much uncertainty as to the near business future, that recovery will probably be slow. Money is "easy," but loans are hard to get. Rates are low, but so is confidence in extending credit.

Railroad business is extremely depressed. In spite of eight years of industrial growth, freight traffic in October has been just about equal to the 1922 average, and the trend was downward. September gross revenues were about 17 per cent under a year ago, although the decline was then well under way, and net operating income was about 21 per cent less.

Mining and oil in general show a poor condition. The oil industry is being forced to drastic price cutting to curtail production. The non-ferrous metals are in a similar situation, with copper producers trying to restrict world production and prices falling to record low levels to allow liquidation of excessive stocks. Our composite curve of mining activity is the lowest since October, 1925.

Exports of steel were off more than seasonally in September and, except for the month of July, were the lowest (making seasonal allowance) since July, 1925.

Sentiment of optimism and pessimism aside, good statistics indicate a continued low demand for steel through the winter months, a more-than-seasonal decline in steel production in the near future, and continued weakness in steel prices.



Spread between production and demand showed a contraction during September. This is a good sign, but further recession in ingot output is indicated.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

(ESTABLISHED 1855)

More Work and More Brains

IT has been well said at various times since the war that the next trade depression would be caused by men making a new mistake. It is perfectly clear now that the prediction was exactly right. The biggest mistake was in connection with there being a bull stock market for a period of fully five years, except for a slight recession of say four months' duration. The inordinate rise in stocks would not in itself make much if any trouble. The damage done was through the influence it had upon men's minds, giving many men the idea that there was a better way to make money than by work. Those who thought otherwise did not criticize strongly, having a lurking suspicion that the easy money men might be right after all.

An apt saying was coined when the boom of 1920 waned: "This is not the coming of hard times, it is the passing of soft times." The mistake had been made of thinking that everybody could prosper by doing as little as possible and charging as much as possible. It did not take many months for events to show that life is not so easy as that. In this recent experience it took longer to show that permanent prosperity for everybody could not be secured by slowly increasing corporate earnings, more rapidly increasing dividends and still more rapidly increasing share prices.

When something has gone wrong, it ought to be a good rule for rectifying the trouble to do the opposite of the thing that caused the trouble. Those who have been urging that things will be righted if everybody at once spends more money would not of course subscribe to that rule. They want you to swallow more than one hair of the dog that bit you. There was a singularly widespread lack of brains up to the time of the stock market break. After other breaks in the stock market there were many tales of people who saw what was coming and got out in time, but such tales were conspicuous by their virtual absence on this last occasion.

As people do have brains it is quite safe to assert that they have more brains than they were using. To get out of the present depression more brains should be used and used assiduously. Such use will result in more work, more labor employment. If we did not do enough thinking during the vogue of the "new era" talk, let us do more now.

A depression slows down practically all the existing industries, previously flourishing. It does not prevent the development of new industries if people can think up a basis for them. History is full of illustrations, and two readily recalled are the tin plate and bicycle industries, both of which were the merest infants at the time of the 1893 panic, ushering in a period of several years' depression. The bicycle industry passed its crest just as the depression ended, while the tin plate industry merely continued to grow. It had already shut off imports except those with drawback allowances.

Even without brains we should no doubt muddle out eventually, but the use of brains will help a great deal.

Railroads Help Price Stabilization

IF the meeting last week of the American Institute of Steel Construction is any guide to the state of mind of steel consumers in general, we have seen the worst of the pessimism, and times will be better. Apportionment of tonnage has not been greatly changed among them as competitors, and the net result has been no expansion in tonnage but a shrinkage in gate receipts. There was an indefinable resolution that it is high time that price cutting were stopped, seeing it profited nothing in increased volume.

There is no question that the change in temper is owing very largely to utterances of the recent meeting of the American Iron and Steel Institute. There went out of that great gathering the belief that pressure for price concessions would be resisted to the limit and that buying of customers would have to cease, that stabilization would be made the first order of the day.

The bridge and building constructors at their meeting exhibited a desire to get into the procession. When competitors are assured they are virtually all on the same plane as regards costs of their raw materials, they eliminate one doubtful item in fixing their quotations. The low levels of steel prices, which go back to early 1922 for parallels, are not of themselves either encouraging business or holding it in check. Rather is there a waiting on signs that price cutting is no more. Stabilization in raw materials for a given line of production ought quickly extend to the next line and so on through distribution to the final product.

Gossip is that the railroads have been sparring for lower rail prices. The postponement of buying on the part of some of the large trunk systems has given weight to the stories. As a commentary on the stiffer attitude taken by the mills, THE IRON AGE can say on good authority that the roads have decided against further delay, and shortly the industry may expect the usual series of releases of orders for regular needs. The roads apparently respect the efforts of the mills, besides recognizing the influence

on business of their decisions, while at the same time appreciating that no little freight revenue redounds out of the several tons of materials that have to be hauled for every ton of finished rails.

The steel consumer is ready for stabilization. He will naturally be watchful of the steel producer. The responsibility of the producer accordingly is great.

Steel's Course Three Years Ago

IT may be profitable to recall what occurred in steel three years ago. In each month February to May inclusive of 1927 previous records of production in those months were broken and then demand settled down for a poor second half. Sellers unguardedly went after business that did not exist and cut prices unnecessarily on the business that was obtainable. Almost before they knew it the market had gotten out of hand.

Then, with low third-quarter earnings reported and still smaller earnings in prospect for the fourth quarter, they undertook to improve their conduct, and with fairly satisfactory results. THE IRON AGE finished steel composite reached its low point Oct. 25, 1927, at 2.293c. a lb., and successive rises carried it to 2.364c. Feb. 14, 1928, or about $1.50 per ton in 16 weeks.

The advancing tendency was practically initiated by a formal announcement Nov. 10 that the Carnegie Steel Co. had advanced its price on bars, shapes and plates from 1.75c. to 1.80c. on large lots and to 1.90c. on small lots, an advance that was promptly followed by other makers. It should be noted that this was weeks before first-quarter contracts would come up for consideration.

In the vague retrospect it might be thought that steel prices simply advanced of their own accord, for the second half of 1927 was poor in steel production while the first half of 1928 made a new record by 4 per cent. It has been said of the stock market: "Prices never go up; they are always put up" and a similar reference to the steel market would not be entirely out of line.

The trade reports at the time did not record a rising tide of demand in advance of the rising price tendency and increased production. The weekly summary in THE AGE IRON of Dec. 8, 1927, said: "Buying for delivery in the first quarter as yet remains moderate." Demand simply worked its way up slowly.

It was a case of men, rather than materials, making the market. The course of affairs during the months just reviewed would not perhaps fully justify this statement, but what occurred afterward confirms the idea. During the second quarter of the year there was quite a bit of slipping in steel prices and that was by no means justified by material things. It was due to men.

The steel trade was in fact in line for still better things, as was shown plainly by the course of production thereafter. July is regularly the low month, but in 1928 June took that position, production gaining month by month for four months, through October. Second-half steel production was 1 per cent above first half production. In no other year has a good first-half been followed by a better second half, there being always a seasonal decrease.

The history of three years ago is not cited with an idea that it would be easy to repeat the performance. There is no prospect of a similar increase in demand, but on the other hand the condition as to prices relative to costs is poorer, prices averaging more than $3 a ton under their 1927 low, which does not tell the whole story because some lines are particularly low.

The light earnings reports of steel companies for the third quarter of 1927 made quite an impression on sellers. Each seller already knew his own earnings were poor, but was encouraged to take a firmer stand through learning that his competitors were likewise suffering.

The Situation in Copper

WHAT is perhaps an unprecedented situation has arisen in copper. In order to explain this it is necessary to review briefly the events of the last year.

In 1929 consumption was the largest of record, but production was in excess thereof, wherefore the omens of a reverse were in evidence a year ago. This was not appreciated, however, until we had entered 1930. American and Chilean producers then curtailed production sharply, but the African and Canadian did not.

In the meanwhile there was a contraction of consumption, but that has been much exaggerated. In the United States real consumption has been 90 per cent of the rate of 1929. France and Great Britain have each accepted as much supply during the first nine months of 1930 as in the corresponding period of 1929. Germany and Italy, whereof the former is by far the more important, alone show sharp recessions.

While in the United States the discharge of copper into consumption has been proceeding at a high rate, the domestic deliveries by refiners have fallen off to something like 66 per cent and their deliveries for export have also severely declined. Notwithstanding the curtailment of production, therefore, the stocks in the hands of American refiners have increased to a large, though not unparalleled, figure. The reasons for this have been four-fold:

1. European requirements have been more proportionately filled by the foreign producers who have not curtailed their production.
2. The stocks existing in the American manufacturing and distributive system, which is an invisible supply far larger than commonly imagined, has been drained.
3. A part of such drainage instead of flowing out into consumption has returned in the form of manufacturing scrap to the refiners.
4. The spirit of liquidation caused the country to be scoured for junk copper, which also swelled the stream on the refiners' side of the dam.

The accumulation of copper in the hands of refiners during 1930 has not meant overproduction of virgin copper so much as it has meant a transfer from what is invisible into that which is statistically reported and therefore regarded as visible.

Something like this occurred in 1921 and upon the restoration of confidence in that period of depression the dam began to leak and copper flowed out rather rapidly to resaturate the manufacturing system. The backing up of stocks in the hands of refiners

does not, therefore, mean necessarily that production is in excess of consumption, but rather may it mean that consumption is still being satisfied by squeezing the invisible stocks further along in the system. That there has been such a process is certain, but in the absence of statistical data it is impossible to describe it in quantitative terms. However, any view of the visible stocks that does not allow for this condition is bound to be erroneous.

When the manufacturing and distributing system has become squeezed to the limit, if consumptive demand be still maintained, it is obvious that refiners' stocks will have to be drawn upon more largely; in other words the orders for shipment from refineries will have to come into harmony with the discharge for final consumption, which so far in 1930 has not been the record. A matter of major concern will then be whether invisible stocks will be replenished to the degree of a year ago, or whether manufacturers having learned to operate with contracted inventory will continue to do so.

An unprecedented and confusing development has been the arrangement by some of the larger manufacturers of copper for great supplies which remain in the custody of the sellers. This immediately explains why reports of huge sales from time to time have not been followed by large shipments and reductions of visible stocks. So it is that a large part of the stocks carried and reported by refiners are not now owned by them and are unavailable to purchasers in general, having been preempted by users who have considered that the acquisition of copper at prices below the economic cost of production was a good investment.

This suggests several possibilities. One is that manufacturers who have made such an investment may abstain from further buying for a long time. Another is that they may buy for current requirements so long as the price is below true cost of production and hold their very cheap copper in reserve, i.e., allowing it to exist as physical stock at refineries rather than at mills.

It is to be wondered why producers have been willing to part with title to so much copper at low prices, even if the bulk of it has realized to them more than the nadir of 9.5c. Financial exigencies are not supposed to have entered into the consideration.

The present situation having developed in the absence of curtailment by the European-controlled and Canadian production, any steps that may be taken in that direction by Katanga and International Nickel may be expected to have a powerful effect. Conferences in respect to this have recently been held. Profitless production does not stimulate consumption; but it does extinguish surpluses; and the experience has been convincing that it is prone to continue until surpluses are gone and often until deficits have been incurred.

Scrapping Old Automobiles

THE question of scrapping old, worn out automobiles has been agitating the motor industry for a year or more. Through the National Automobile Chamber of Commerce, the automobile manufacturers have been investigating the matter from all angles and have tried out a number of plans, none of which, however, thoroughly solves the problem in the utilitarian sense of salvaging the old material for the benefit of the industries which can re-use the steel and other materials.

Under the guise of a "national safety campaign," the automobile industry has chiefly concerned itself with an effort to get the old cars off the roads so that they would not prove to be an eyesore and a menace, thereby increasing the obsolesence rate so that the replacement demand for automobiles might be put on a higher level. It remained for the Ford Motor Co. to demonstrate how old automobiles could be dismantled and salvaged economically even to the tires and the oil. Ford's experiment has proved so successful that a specially built furnace has recently been ordered that will melt virtually the whole car after it has been stripped of its non-metallic parts.

A large steel company is considering the Ford plan and may install automobile salvaging plants at three of its mills. At Cleveland, a scrap yard is operating experimentally under the direction of an association of automobile manufacturers and dealers for the exclusive purpose of wrecking old automobiles.

There is nothing new in the salvaging of scrap from worn out automobiles, but there is something new in the idea of doing it on a nation-wide scale with proper safeguards and restrictions for the automobile trade and for those who purchase the old material for remelting. Any nation-wide plan to be workable must provide a central salvaging plant in all large communities; it must be assured of a large and steady flow of old automobiles; it must refrain from flooding the market with reclaimed parts and accessories, because the automobile industry undoubtedly would not subscribe to a plan which threatened injury to manufacturers of accessories; it must segregate with great care the various alloy steels which have a premium value when properly classified, but which only prove a nuisance when improperly mixed with carbon steels.

All of which goes to show that the systematic salvaging of material from old automobiles on a large scale is a business that requires organization, knowledge and thorough cooperation between the automobile trade and the agencies employed to turn old cars into usable material. The iron and steel scrap industry, through its institute, is considering a plan which may bring the proper solution. It is a significant indication of the automobile industry's great interest in the problem that a representative of the General Motors Corpn. was listening in at a discussion of this subject at a meeting of the advisory council of the Institute of Scrap Iron and Steel last week at Cleveland.

In normal years from 2,500,000 to 3,000,000 cars, it is estimated, become ready for the scrap heap. Here is a business running into millions of dollars a year that is ready for an efficient method of handling.

Copper electrotyping, used extensively for the reproduction of printing plates employed in the printing of magazines and books, is the subject of a circular issued by the Superintendent of Documents, Government Printing Office, Washington, at 10c. a copy. It is the Bureau of Standards circular No. 387.

Pig Iron Production Declines 8 Per Cent in October

NET Loss of 74 Blast Furnaces Since April 1—Steel Output Now on 48 Per Cent Basis—Scrap Still Declining

OCTOBER proved another month of sharp curtailment of pig iron production. Total output was 2,164,768 tons, compared with 2,276,770 tons in September, while the daily rate, at 69,831 tons, fell 8 per cent below that of the previous month and reached the lowest level for any October since 1921.

Sixteen furnaces were blown out during the month and only four were lighted, making a net loss of 12. This marks the seventh consecutive reduction in active capacity and brings the total number of producing stacks down to 111, or 74 fewer than on April 1, at the beginning of the decline. On Nov. 1 pig iron was being made at a rate of 65,965 tons a day.

While November is still too young to give any clear indications as to the trend of pig iron production, current reports on steel plant operations are not reassuring. Further retrenchment at Chicago, Cleveland, Buffalo and in the East have brought average ingot output down to 48 per cent, compared with 50 per cent a week ago.

The steel trade still clings to the opinion that production is close to bottom, counting on increased railroad buying, together with a possible gain in structural steel awards, to offset losses in tin plate and line pipe tonnage. Developments of the week tend to support this view.

The Santa Fe has entered the market for 2350 freight cars and the Pennsylvania will build 1500 cars in its own shops, while the Interborough Rapid Transit Co., New York, will soon take bids on 289 subway cars. Adding to this equipment the 2000 cars to be built by the Baltimore & Ohio and the 600 for which the Virginian has inquired, there is a total of nearly 115,000 tons of car-building steel in the market.

Rail orders in early prospect from the Pennsylvania, New York Central and Erie aggregate 465,000 tons. The Chesapeake & Ohio has bought 11,000 tons of tie plates, while Western roads have placed orders for 17,000 tons of track accessories with Chicago mills.

New structural steel projects, at 104,000 tons, are the largest for any week since June. Both public works and utility programs are being expedited in an effort to relieve unemployment.

Tin plate output has declined to 45 per cent, while line pipe production, although still fairly high, has receded enough in the past week in the Chicago district to reduce steel plant operations from 57 to 50 per cent of capacity. Farm equipment makers are slow in starting their spring production programs, although their steel specifications are beginning to turn upward.

Automobile output in October probably did not exceed 200,000 cars for the United States and Canada, compared with 231,000 in September, and the chances of a gain in November depend mainly upon the rapidity with which the Chevrolet company gets into production on its new models. The Cleveland plant of the Fisher Body Corpn. is now turning out 15,000 unassembled Chevrolet bodies a week, and the Chevrolet company has issued specifications for a large tonnage of automobile body sheets for December shipment.

Scrap markets continue to weaken, with heavy melting grade off 50c. a ton at Pittsburgh and Chicago and 25c. at St. Louis and Cleveland. THE IRON AGE composite price for heavy melting steel scrap has declined from $12.25 to $11.92 a gross ton, the lowest level since April, 1921, and within striking distance of the lowest average of that year—$11.50, reached on April, 21.

Neither pig iron nor finished steel prices have shown further changes of importance. New minimum prices have appeared on cold-finished steel bars and tin mill black plate, representing reductions of $2 and $1 a ton respectively.

Pig iron demand remains apathetic, but there are signs, still inconclusive, that foundry melt has passed its low point, barring year-end suspensions for inventory. Central Western furnaces report better shipping orders from some of the automobile manufacturers and from the stove and furnace trade, as well as a slight gain in releases from agricultural equipment makers.

The movement of Lake Superior iron ore by water is drawing to a close and total shipments for the year will be approximately 47,000,000 tons, or less than for any season since 1924.

Our London cable reports that the Federation of British Industries believes that the forces responsible for the collapse of world commodity prices have almost spent themselves.

THE IRON AGE composite prices for finished steel and pig iron are unchanged at 2.135c. a lb. and $16.29 a gross ton respectively.

PITTSBURGH

Railroad Buying and Structural Business Only Favorable Factors in Steel

PITTSBURGH, Nov. 3.—Additional inquiry from the railroads and sustained activity in the structural steel market have helped the steel industry in the Pittsburgh district to hold its own in the last week. Had it not been for these factors, the outlook might have been gloomier than before as specifications for flat-rolled products were very light and finishing operations in sheets, tin plate and strip steel all have fallen to the lowest point of the year.

Thus far, railroad business has been principally in the car-building field, although a few rail orders have been received and the local mill is operating in a limited way. The 1500 freight cars to be built by the Pennsylvania in its own shops will take 40,000 to 45,000 tons of steel and steel products, which, added to the requirements of the Baltimore & Ohio and the Virginian, will bring the prospective volume of car steel to about 75,000 tons.

Prospects among the other large consuming industries have not changed much, although the automobile industry seems certainly to have reached its minimum production, and gains in requirements of companies which are bringing out new models will likely offset reductions elsewhere in the Detroit district. Some Pittsburgh mills have had slightly heavier specifications from agricultural implement makers and believe that this group will soon begin work in a fairly large way on spring requirements.

Steel ingot operations in the Pittsburgh district are holding at about 50 per cent of capacity. The leading interest has not fallen under 55 per cent, even though three of its blast furnaces were blown out or banked in the last week of October. Operations of the independent companies range from 40 to 50 per cent. Finishing mills are maintaining a slightly lower operation than open-hearth departments, with the exception of structural and plate units and seamless and electric welding pipe mills, which are somewhat higher. Curtailment in tin plate production has been sharp, largely because the seasonal decline did not come as early as usual.

The low rate of mill operations is made increasingly unprofitable by the efforts of the larger companies to maintain limited operations at every plant rather than to concentrate activity at one point. This policy, however, enables labor to be engaged on a part-time basis at all plants and is the industry's contribution to alleviation of the unemployment situation. The Steel Corporation subsidiaries are following this policy vigorously in this district.

Steel prices are not materially changed, with weakness most pronounced in sheets. This tendency is reflected particularly in the extension of minimum quotations to a wider range of buyers.

Railroad car business calls for 75,000 tons of steel, soon to be placed with mills.

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Structural steel tonnage and prospective railroad buying most favorable factors in steel market.

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Operations in Pittsburgh district barely holding their own at average of 50 per cent ingot rate.

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Steel prices not materially changed, but weakness continues in sheet mill products.

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Scrap prices undergo further downward revision. No. 1 heavy melting steel at average of $13.75.

Pig Iron

October shipments of a number of the merchant producers in this district exceeded those of the previous month, and the slight acceleration in consumer requirements evidenced in the last week or two seems to be maintained. Nevertheless, foundry operations are spotty and indications of a larger melt are often nullified by suspension of shipments a few days later. Scarcely any open inquiry is before the trade and most of the new buying is confined to lots of 200 tons or less. Mixed carloads are not uncommon and consumer stocks are so light that immediate shipment is nearly always demanded. No merchant capacity is active in either the Pittsburgh district or the Valleys, and yard stocks are low with the exception of accumulations of basic iron at independent steel works stacks. However, little effort is being made to move this iron and six steel company stacks went out of blast in the Pittsburgh and Valley districts during October. One of the Eliza group of the Jones & Laughlin Steel Corpn. was lighted on Nov. 1, offsetting the blowing out of a furnace at that plant in the preceding week.

Quotations on pig iron are unchanged, and shading is difficult to identify because of the freight rate advantage enjoyed by the Neville Island furnace in the Pittsburgh district. Valley producers must quote an average of 50c. a ton lower than their official base price to meet the local furnace's figures of $17.50 on basic and foundry iron and $18 on malleable and Bessemer.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$17.00
Bessemer	17.50
Gray forge	16.50
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.50
Low phos., copper free	$26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, $1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$17.50
No. 2 foundry	17.50
No. 3 foundry	17.00
Malleable	18.00
Bessemer	18.00

Freight rates to points in Pittsburgh district range from 63c. to $1.13.

Semi-Finished Steel

With shipments to non-integrated sheet and strip makers at a minimum, the market is very dull, and no transactions in billets, slabs and sheet bars are reported. While it is believed that scarcely any tonnage is moving at $31, Pittsburgh, this figure still represents the nominal market.

Bars, Plates and Shapes

Announcement by the Pennsylvania Railroad that it will begin work immediately on the construction of 1500 65½-ft. steel gondola cars in its own shops is the feature of the market on the heavy hot-rolled products this week. The cars are to be allocated equally among shops at Harrisburg, Altoona and Pitcairn and will take 40,000 to 45,000 tons of steel and steel products, principally plates and shapes. Added to the previous inquiries of the Baltimore & Ohio and the Virginian, this brings the tonnage of car-building steel now pending to nearly 75,000 tons, a large part of which will likely be rolled in Pittsburgh district mills. The Virginian will open bids on its recent inquiry on Nov. 5 and the Baltimore & Ohio is expected to take action within the next two weeks.

Structural steel work also continues active, and the predominance of public works in both inquiries and lettings clearly indicates the Government stimulus along this line. The West End-North Side bridge over the Ohio River at Pittsburgh, calling for 6600 tons of shapes, has been awarded to the American Bridge Co. and this company is also low bidder on 5300 tons for a bridge across the Ohio at Evansville, Ind. A local company was low on the approaches to this bridge, which will take 2400 tons. Steel work on the Federal Reserve Bank Building at Pittsburgh, amounting to about 800 tons, is also understood to have been placed. Reinforcing bars are also active, as the type of work now under consideration usually takes large tonnages of bars as well as shapes. A filtration

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Nov. 3, 1930	Oct. 28, 1930	Oct. 7, 1930	Nov. 4, 1929
No. 2 fdy., Philadelphia	$18.76	$18.76	$18.76	$21.26
No. 2, Valley furnace	17.00	17.00	17.50	18.50
No. 2 Southern, Cin'ti	15.19	15.19	15.19	17.69
No. 2, Birmingham	14.00	14.00	14.00	14.50
No. 2 foundry, Chicago*	17.50	17.50	17.50	20.00
Basic, del'd eastern Pa.	17.75	17.75	17.75	19.75
Basic, Valley furnace	17.00	17.00	17.00	18.50
Valley Bessemer, del'd P'gh	19.26	19.26	19.76	20.76
Malleable, Chicago*	17.50	17.50	17.50	20.00
Malleable, Valley	17.50	17.50	18.00	19.00
L. S. charcoal, Chicago	27.04	27.04	27.04	27.04
Ferromanganese, furnace	94.00	94.00	94.00	105.00
Rails, Billets, Etc., Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh	31.00	31.00	31.00	35.00
Sheet bars, Pittsburgh	31.00	31.00	31.00	35.00
Slabs, Pittsburgh	31.00	31.00	31.00	35.00
Forging billets, Pittsburgh	36.00	36.00	36.00	40.00
Wire rods, Pittsburgh	36.00	36.00	36.00	40.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.85
Finished Steel, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.60	1.60	1.60	1.90
Bars, Chicago	1.70	1.70	1.70	2.00
Bars, Cleveland	1.65	1.65	1.65	1.90
Bars, New York	1.93	1.93	1.93	2.24
Tank plates, Pittsburgh	1.60	1.60	1.60	1.90
Tank plates, Chicago	1.70	1.70	1.70	2.05
Tank plates, New York	1.88	1.88	1.88	2.17½
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.90
Structural shapes, Chicago	1.70	1.70	1.70	2.00
Structural shapes, New York	1.85½	1.85½	1.85½	2.14½
Cold-finished bars, Pittsburgh	*2.00*	2.10	2.10	2.30
Hot-rolled strips, Pittsburgh	1.60	1.60	1.60	1.90
Cold-rolled strips, Pittsburgh	2.35	2.35	2.35	2.75

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Finished Steel, *Per Lb. to Large Buyers:*	Nov. 3, 1930 Cents	Oct. 28, 1930 Cents	Oct. 7, 1930 Cents	Nov. 4, 1929 Cents
Sheets, black, No. 24, P'gh	2.35	2.35	2.40	2.75
Sheets, black, No. 24, Chicago dist. mill	2.45	2.45	2.55	2.85
Sheets, galv., No. 24, P'gh	2.95	2.95	3.00	3.50
Sheets, galv., No. 24, Chicago dist. mill	3.10	3.10	3.10	3.60
Sheets, blue, No. 13, P'gh	2.05	2.05	2.05	2.35
Sheets, blue, No. 13, Chicago dist. mill	2.25	2.25	2.25	2.45
Wire nails, Pittsburgh	1.95	1.95	2.00	2.40
Wire nails, Chicago dist. mill	*2.60*	2.05	2.10	2.45
Plain wire, Pittsburgh	2.30	2.30	2.30	2.40
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.40
Barbed wire, galv., Pittsburgh	2.60	2.60	2.70	3.05
Barbed wire, galv., Chicago dist. mill	2.75	2.75	2.85	3.15
Tin plate, 100-lb. box, P'gh	$5.00	$5.00	$5.00	$5.35
Old Material, Per Gross Ton:				
Heavy melting steel, P'gh	*$13.75*	$14.25	$14.75	$17.25
Heavy melting steel, Phila	11.50	11.50	13.00	15.50
Heavy melting steel, Ch'go	*10.50*	11.00	12.00	13.75
Carwheels, Chicago	12.50	12.50	13.50	14.00
Carwheels, Philadelphia	15.00	15.00	15.00	16.50
No. 1 cast, Pittsburgh	12.75	12.75	13.25	15.50
No. 1 cast, Philadelphia	*12.00*	13.00	13.00	16.00
No. 1 cast, Ch'go (net ton)	10.00	10.00	11.00	14.00
No. 1 RR. wrot., Phila.	14.00	14.00	15.00	16.00
No. 1 RR. wrot., Ch'go (net)	9.00	9.00	9.25	13.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.60	$2.60	$2.60	$2.65
Foundry coke, prompt	3.50	3.50	3.50	3.75
Metals, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Lake copper, New York	9.62½	9.62½	10.12½	18.12½
Electrolytic copper, refinery	9.25	9.25	9.75	17.75
Tin (Straits), New York	*25.75*	27.12½	27.37½	40.12½
Zinc, East St. Louis	**4.25**	3.95	4.20	6.50
Zinc, New York	**4.60**	4.30	4.55	6.85
Lead, St. Louis	4.95	4.95	5.10	6.35
Lead, New York	5.10	5.10	5.25	6.50
Antimony (Asiatic), N. Y.	*7.12½*	7.37½	7.50	8.62½

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

plant at Youngstown requiring 1100 tons of bars has been let, and a round tonnage of reinforcing steel will be required for the substructure of the Tenth Street Bridge at Pittsburgh, on which the Vang Construction Co., Pittsburgh, is low bidder on the general contract.

Production of bars, plates and shapes in this district averages 50 to 60 per cent, but merchant bar mills are running at a much slower rate.

Reports of price stabilization on bars, plates and shapes seem to apply principally to small-tonnage orders, as sharp concessions are being made on so-called desirable business, especially when structural shapes are concerned. The general market continues at 1.60c., Pittsburgh, on plates and shapes, and 1.60c. to 1.65c. on bars. Efforts to get the higher price on bars are being made only in the case of carload lots or less.

Rails and Track Accessories

This market is still centered in expections rather than actualities, as concrete inquiry for rails and accessories is lacking in the Eastern district. The Baltimore & Ohio and the Erie have indicated their intention of taking 75,000 and 40,000 of rails respectively, but the largest Eastern roads have announced nothing formally and speculation regarding their probable requirements differs widely. It is believed that failure to specify against optional tonnage this year will not materially affect 1931 requirements, but last year's contracts have not been entirely completed in some instances and some adjustments may have to be made. Track supplies are quiet from the standpoint of both shipments and new inquiry. The New York, New Haven & Hartford is asking for bids on 4000 kegs of spikes. Prices on track accessories are fairly well maintained. New billet light rails are quotable at $34, Pittsburgh.

Tubular Goods

Pipe production is gradually being brought into line with limited current demand, and lapweld and buttweld capacity in the district is not engaged at more than 35 per cent of capacity. Seamless activity is considerably higher, but was curtailed considerably during the past month as producers completed line pipe orders. Considerable tonnage remains to be shipped against orders of this sort and a few units will be active until the end of the year.

Wire Products

Makers of wire products have adjusted their prices on merchant items to a basis of $1.95 per 100-lb. keg on nails, which is now the general price to jobbers. The price to the trade is nominally $2 a ton higher, but very small users have been able to buy at $2 a keg and the $2.05 price is seldom effective. Manufacturers' wire continued at 2.30c., Pittsburgh, subject to occasional shading.

Tin Plate

Interest is centered in contracting for next year, which is still being postponed by the principal consumers. Missionary work on the part of manufacturers indicates no objection to the current quotation of $5 per base box, Pittsburgh, and any future revision would certainly be attributable to makers rather than consumers. Seasonal curtailment in production continues, with the industry now operating at about 45 per cent of capacity in the Pittsburgh and Valley districts.

THE IRON AGE COMPOSITE PRICES

	Finished Steel	Pig Iron	Steel Scrap
Nov. 3, 1930	2.135c. a Lb.	$16.29 a Gross Ton	$11.92 a Gross Ton
One week ago	2.135c.	16.29	12.25
One month ago	2.142c.	16.38	13.25
One year ago	2.362c.	18.38	15.50
	Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1930.....	2.362c., Jan. 7	2.135c., Oct. 14	$18.21, Jan. 7	$16.29, Oct. 14	$15.00, Feb. 18	$11.92, Nov. 3
1929.....	2.412c., April 2	2.362c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928.....	2.391c., Dec. 11	2.314c., Jan. 3	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927.....	2.453c., Jan. 4	2.293c., Oct. 25	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22
1926.....	2.453c., Jan. 5	2.403c., May 18	21.54, Jan. 5	19.46, July 13	17.25, Jan. 5	14.00, June 1
1925.....	2.560c., Jan. 6	2.396c., Aug. 18	22.50, Jan. 13	18.96, July 7	20.83, Jan. 13	15.08, May 5

Strip Steel

Specifications are sporadic and mill operations are spotty. Many producers are running individual units every other week, although the wide range of specifications and urgency for delivery often forces an operation of one or two days a week on each mill. Scarcely any automobile tonnage is coming out, but improvement is looked for from certain makers in the Michigan territory before the end of the month as production begins on new models. Radio manufacturers continue to take a substantial tonnage. Hot mill operations average 40 to 50 per cent of capacity, with cold rolling units at 30 to 40 per cent. Prices are fairly well maintained at 2.35c. to 2.45c., Pittsburgh, on cold-rolled and at 1.60c. and 1.70c. on hot. Cooperage stock is quotable at 1.90c., Pittsburgh.

Coke

Improved demand for heating coke has been general in the last week, but the furnace grade is just as dull as ever and foundry requirements show no perceptible increase. Spot buying of domestic coke is heavier than usual, as little winter contracting took place earlier in the year. The price is holding at $2.40. Reduced blast furnace activity has naturally depressed the market on the furnace grade, but oven operations in the Connellsville region are restricted. Competition of by-product ovens is also an unfavorable factor. The price is weak at $2.60, Connellsville, but business at $2.50 is hardly common enough to justify a lower quotation.

Sheets

Even considering the spotty character of the sheet market at this time, last week was very poor from the standpoint of specifications. As a result, operations will be subject to curtailment in the Pittsburgh and nearby districts, falling under the 45 per cent rate reported for last week. Orders are generally for small lots and, while fairly numerous, do not make a substantial aggregate. The larger consuming groups have shown no improvement, although the promise of improved production by certain automobile makers this month is likely to bring out larger orders than have been coming from the Detroit area in recent weeks.

Prices continue rather weak. Tin mill black plate is now quotable at 2.65c. to 2.70c., a decline of $1 a ton. Galvanized material is subject to considerable shading of $1 and $2 a ton, and a number of makers are now making a price of 2.90c. a lb. to jobbers. The trade in general has little difficulty in placing business at 2.95c., although the official price is unchanged at 3c. On the other finishes a $2 range is necessary to represent the market.

Old Material

Following another week of no substantial mill buying, the scrap market has declined sharply on all the principal grades, and No. 1 heavy melting steel is now quotable at $13.50 to $14, a reduction of 50c. a ton. Most dealers are quite willing to sell at $14 and are able to pick up this grade of scrap at even less than $13.50.

Warehouse Prices, f.o.b. Pittsburgh

	*Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.75c.
Reinforcing steel bars	2.75c.
Cold finished and screw stock—	
Rounds and hexagons	3.35c.
Squares and flats	3.85c.
Bands	3.10c.
Hoops	4.10c.
Black sheets (No. 24), 25 or more bundles	3.15c. to 3.25c.
Galv. sheets (No. 24), 25 or more bundles	3.75c. to 3.85c.
Light plates, blue annealed (No. 10), 1 to 24 plates	2.75c.
Blue annealed sheets (No. 13)	2.65c.
Galv. corrug. sheets (No. 28), per square	4.25c.
Spikes, large	2.65c.
Small	3.05c. to 4.50c.
Boat	3.15c.
Track bolts, all sizes, per 100 count,	60 and 10 per cent off list
Machine bolts, 100 count,	60 and 10 per cent off list
Carriage bolts, 100 count,	60 and 10 per cent off list
Nuts, all styles, 100 count,	60 and 10 per cent off list
Large rivets, base per 100 lb.	$3.30
Wire, black, soft ann'l'd, base per 100 lb.	$2.40 to 2.50
Wire, galv. soft, base per 100 lb.	2.85 to 2.95
Common wire nails, per keg	2.25
Cement coated nails, per keg	2.45

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 3999 lb.

One consumer purchased a small tonnage of hydraulic compressed sheets at $13.75, but has since turned down further offers at that figure. Machine shop turnings are also lower, following a mill purchase at $6.50, and specialties have declined slightly on the basis of consumer buying at $16.75.

The market has now reached a level which should make buying for investment purposes by both mills and dealers attractive, and, even though dealer yard stocks are fairly large, most of them are willing to pick up scrap which is readily available. The prospect of substantial mill buying in the near future seems less likely than it was a short time ago, and the scrap market does not appear to have definitely reached bottom. However, consumer purchases might change the picture very suddenly.

The November scrap list of the Pennsylvania Railroad is extremely unusual because of its small size, a total of only 25,400 tons, and because it contains no heavy melting steel or rails. The list is also considerably later than usual, as bids are not to be opened until Nov. 12.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$13.50 to $14.00
No. 2 heavy melting steel	10.50 to 11.00
Scrap rails	13.25 to 13.75
Compressed sheet steel	13.75 to 14.25
Bundled sheets, sides and ends	11.00 to 11.50
Cast iron carwheels	13.50 to 14.00
Sheet bar crops, ordinary	14.00 to 14.50
Heavy breakable cast	9.50 to 10.00
No. 2 railroad wrought	13.50 to 14.00
Hvy. steel axle turnings	11.50 to 12.00
Machine shop turnings	6.00 to 6.50
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	16.25 to 16.75
Railr. coil and leaf springs	16.25 to 16.75
Rolled steel wheels	16.25 to 16.75
Low phos. billet and bloom ends	17.50 to 18.00
Low phos. mill plates	15.50 to 16.00
Low phos. light grades	15.50 to 16.00
Low phos. sheet bar crops	16.50 to 17.00
Heavy steel axle turnings	11.50 to 12.00
Electric Furnace Grades:	
Low phos. punchings	15.50 to 16.00
Heavy steel axle turnings	11.50 to 12.00
Blast Furnace Grades:	
Short shoveling steel turnings	8.00 to 8.50
Short mixed borings and turnings	8.00 to 8.50
Cast iron borings	8.00 to 8.50
Rolling Mill Grades:	
Steel car axles	18.50 to 19.00
Cupola Grades:	
No. 1 cast	12.50 to 13.00
Rails 3 ft. and under	14.50 to 15.00

CHICAGO

Pig Iron and Ingot Output Curtailed Further
Santa Fe Inquires for 2300 Cars

CHICAGO, Nov. 3.—Chicago district steel mills continue to adjust pig iron output in accordance with actual requirements, with the result that a blast furnace has been blown out, making the active count for the district 14 of 36. The Steel Corporation is now using 10, Inland Steel, two, Youngstown Sheet & Tube, one, and Wisconsin Steel, one. Similar readjustments are also taking place in ingot production, and the week has registered a loss of somewhat more than five points, the average output in the district not being above 50 per cent of capacity.

Rolling schedules are very uncertain because of the spotty character of specifications. It is not uncommon for a mill to start the week at better than 50 per cent of capacity and to end the period at close to 40 per cent. The main reason for this situation is a loss of much of the support recently given the plate market by the manufacture of pipe. Miscellaneous plate business is growing, and the promise of 2300 cars from the Santa Fe is encouraging, but mills lack not only volume but uniformity of flow of orders.

Those who are reviewing the pipe business believe there is at least two more years of main line pipe business in sight and following that there will be a very substantial volume of orders for feeder and distributing lines. It is now thought that the second line to Chicago will be started as soon as the first, now under construction, is finished, and that a third gas line will follow completion of the second.

New buying of finished steel products, not including rails, shows a moderate gain over that of the previous week, but specifications for all steel mill products are light.

Pig iron output by steel companies curtailed by blowing out of one furnace. Ingot production down to 50 per cent.

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Finishing mill schedules spotty and lose support of recent heavy demands for pipe fabrication.

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Santa Fe Railroad comes into market for upward of 2300 freight cars and some passenger equipment.

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Pig iron shipments promise to gain this month over those of October.

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Scrap continues weak, with wide reductions on a number of grades.

Ferroalloys

Several sales and a few small inquiries for spiegeleisen are reported. Next year's contract prices have not been announced, though the time is near at hand when they may be expected.

Pig Iron

This market is showing more life, and releases already at hand give promise that deliveries this month will exceed those in October, which did not show a gain over September. New sales, most of which are for delivery after the turn of the year, are running remarkably steady from week to week. Prices remain at $17.50 a ton, base, local furnaces. Four merchant stacks are in blast.

Some sellers of charcoal iron are again pressing sales and lower prices have been named to a number of consumers who will substitute charcoal for other grades of iron. It is reported that on sales of this kind as low as $18, furnace, has been named. Ordinary tonnages to regular consumers are priced at $24 a ton, furnace. The silvery market is dull in sales, specifications and shipments.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$17.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75	18.00
Malleable, not over 2.25 sil.	17.50
High phosphorus	17.50
Lake Super. charcoal, sil. 1.50	27.04
S'th'n No. 2 fdy.	17.51
Low phos., sil. 1 to 2 copper free	$28.50 to 29.20
Silvery, sil. 8 per cent	26.79
Bess. ferrosilicon, 14-15 per cent	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Warehouse Business

Inquiries and new business are scattered, but the aggregate movement from warehouses in this district during the last week of October was well up to the average of recent weeks. Prices are stable, especially in Chicago and the immediate vicinity.

Sheets

This market is subject to rather wide fluctuations not only from week to week, but also from the beginning to the end of each seven-day period. Mails that accumulate over the week-end quite often look encouraging and afford hot mill operation at the start of each week at a satisfactory rate, considering the business situation as a whole. However, it quite often happens that schedules taper by the time midweek is reached. Average output in this district ranges between 50 and 55 per cent of capacity. The mills at Milwaukee are scheduled to resume operations this week. This is not brought about by increased orders, but rather is a reallotment between producing units of such business as is available.

Consumption is perhaps a little lighter. Sellers are keenly disappointed over the lack of interest shown by manufacturers of farm equipment, who earlier in the month tentatively set the first week in November as the time when winter manufacturing schedules would get under way. The price situation is unsettled, especially on blue annealed sheets.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.50c. to 2.60c.; No. 24 galv., 3.15c. to 3.25c.; No 10 blue ann'l'd, 2.15c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Bars

Several encouraging developments have occurred in the local bar market. Specifications and new buying, though still of small proportions, continue to show moderate gain, and some users, especially in the Detroit area, anticipating the close of navigation on the Great Lakes, have purchased and will take rather freely of the alloy steel commodity. The iron bar market remains sluggish in the absence of railroad car work. Prices for rail steel bars are holding at 1.65c. a lb., district mill. Backlogs are light, and new purchases, which are quickly entered on rolling schedules, show little change in the week.

Structural Material

From all outward appearances demand for structural material is destined for improvement in the early months of 1931. Architects, when looking beyond the end of this year, believe they can see not only revival of many important projects which have passed over their boards, but the turn of events in the last week discloses that new work is developing. The new Post Office, the Field Estate Building and the first section of the subway account for not far from 100,000 tons of steel. These projects, it is felt, will be under way early in 1931. Several architects report that new work of interesting size has come to them in the week. The Public Service Co. of Northern Illinois will start this fall on $1,000,000 worth of new work which had been planned for next year.

Plates

Ingot operations in this district have dropped at least five points because of loss of support of recent heavy plate demands for pipe. Fresh inquiry for tank work comes from the Prairie

Pipe Line Co., which will use 15,000 tons for storage capacity at its various pumping units.

Cast Iron Pipe

Activity is no more marked than a week ago. At the elections this week a number of bond issues will be voted on in and around Chicago. Many of these, especially in the nearby towns, are for improvements and enlargement of existing water supplies and distribution, the drought last summer having clearly shown that many systems are inadequate except for normal and light demands. Tonnages needed for these projects will not come up for figures until spring or at best in late winter, but they at least give sellers something to look forward to. Gas companies have been holding closely to pipe-laying plans prepared earlier in the year. This is shown by the fact that most contracts have been specified in full. The United States Pipe & Foundry Co. has taken 275 tons of 6 and 8-in, pipe for Lima, Ohio, at $37 a ton, Birmingham. Among new inquiries is one from Rushville, Neb., which calls for 9000 ft. of 4 and 6-in. pipe.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, $44 to $45; 4-in., $47 to $48; Class A and gas pipe, $3 extra.

Reinforcing Bars

Dealers, in their contacts with architects, are finding some assurance that a number of major projects planned some time ago are being reconsidered for construction that will begin in the spring. October shipments of reinforcing bars from warehouses were the lowest for any month in several years. The Chicago subway, which is expected to take a large tonnage of bars, appears nearer. Sellers are roughly estimating that the local Post Office will take upward of 2000 tons. Road lettings continue active, but the bulk of tonnage placed this fall will be carried over to spring before being shipped.

Wire Products

The measure of wire mill operations this week shows that the district cannot boast of a higher range than 35 to 40 per cent, which in itself is not entirely unsatisfactory in view of business conditions existing at the end of October. Winter weather has already struck the Northwest and the Mountain States, and therefore distribution of commodities used in outdoor construction has suffered a seasonal setback in those sections. This is reflected in reports from warehousemen, who at the same time are optimistic concerning the movement from stock of such items as normally come into demand at this time of year.

Specifications from the manufacturing trade are lighter in a number of directions. Demand for wire rope is taking a turn for the better and the outlook is not unfavorable for the remaining months in this year. Users of electrical cables and the smaller sizes of insulated copper wires are being attracted into the market by the very low price of copper. Sales during the week can be characterized as brisk when compared with many of the quiet weeks experienced during the fall months. Consumption of magnet wire, though not showing normal fall expansion, is nevertheless somewhat improved following greater needs by manufacturers of radio equipment.

Rails and Track Supplies

Purchases in this market aggregate 17,000 tons of track accessories, and 15,000 tons remains on inquiry. Specifications for these commodities are somewhat larger. No further rail orders have been placed. Rail output, which is a little heavier, ranges between 25 and 30 per cent of capacity.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, $43; light rails, rolled from billets, $36. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.07½c. to 2.15c.; angle bars, 2.75c.

Bolts, Nuts and Rivets

Releases for these commodities at the opening of November are on a par with the average in October, which was a slightly better month than September. Farm implement manufacturers, automobile plants and jobbers all contributed to the small betterment shown last month. Output stands at 40 per cent or a little less, and there is some promise that this may hold if moderate expansion, now expected at an early date in the farm implement group, actually develops.

Coke

Shipments of by-product foundry coke made moderate but steady gains throughout October, and current specifications show no tendency to drop. Next year's books have been opened and probably one-half of the normal number of contracts have been closed at $8 a ton, local ovens.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.90c.
Reinforc'g bars, billet steel—	
Less than 5 tons	2.85c.
5 tons to 30 tons	2.45c.
30 tons to 200 tons	2.00c.
200 tons and over	1.75c.
Rail steel reinforcement—	
Less than 5 tons	2.50c.
5 tons to 30 tons	2.10c.
30 tons and over	1.50c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.35c.
Flats and squares	3.85c.
Bands ¼ in. (in Nos. 10 and 12 gages)	3.10c.
Hoops (No. 14 gage and lighter)	3.65c.
Black sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Blue ann'l'd sheets (No. 10)	3.35c.
Spikes (⅜ in. and larger)	3.55c.
Track bolts	4.55c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
	Per Cent Off List
Machine bolts	60 and 10
Carriage bolts	60 and 10
Coach or lag screws	60 and 10
Hot-pressed nuts, sq., tap. or blank,	60 and 10
Hot-pressed nuts, hex., tap., or blank,	60 and 10
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	$2.30 to 2.55
Cement c't'd nails, base per keg	2.30 to 2.55

Old Material

The local scrap market, which has recently turned markedly weaker, shows no signs of recovery. Published prices are for the most part nominal, since sales are very few in number and therefore offer little gage of the market. The fact is that dealers, pressed with tonnages that they wish to place, are now offering much scrap at prices that are well below levels established when the last sales were made. Distress tonnage appearing on track is becoming increasingly troublesome and this difficulty of the trade promises to become intensified.

Accumulations in principal yards and at major points of consumption are said to approximate 300,000 tons. Dealers, in attempting to look into the future, see a dull market not only during such time as consumption remains low, but for some time after general business picks up and while this large accumulation is being reduced. Mills are well fortified with large stocks of heavy melting steel and are accepting only very small shipments. Cast iron borings is another grade in which there is practically no movement.

Prices deliv'd Chicago district consumers:

	Per Gross Ton
Basic Open-Hearth Grades:	
Heavy melting steel	$10.50 to $11.00
Shoveling steel	10.50 to 11.00
Frogs, switches and guards, cut apart, and misc. rails	11.50 to 12.00
Hydraul. comp. sheets	9.00 to 9.50
Drop forge flashings	7.75 to 8.25
No. 1 busheling	8.00 to 8.50
Forg'd cast and r'l'd steel carwheels	14.25 to 14.75
Railroad tires, charg. box size	13.50 to 14.00
Railroad leaf springs cut apart	13.50 to 14.00
Acid Open-Hearth Grades:	
Steel couplers and knuckles	12.50 to 13.00
Coil springs	12.25 to 12.50
Electric Furnace Grades:	
Axle turnings	9.25 to 9.75
Low phos. punchings	12.00 to 12.50
Low phos. plates, 12 in. and under	12.00 to 12.50
Blast Furnace Grades:	
Axle turnings	5.75 to 6.25
Cast iron borings	4.50 to 5.00
Short shoveling turnings	4.75 to 5.25
Machine shop turnings	5.00 to 5.50
Rolling Mill Grades:	
Iron rails	11.50 to 12.00
Rerolling rails	12.50 to 13.00
Cupola Grades:	
Steel rails, less than 3 ft.	12.75 to 13.25
Steel rails, less than 2 ft.	13.00 to 13.50
Angle bars, steel	12.00 to 12.50
Cast iron carwheels	12.50 to 13.00
Malleable Grades:	
Railroad	13.00 to 13.50
Agricultural	11.25 to 11.50
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heavier	26.00 to 31.00
	Per Net Ton
Rolling Mill Grades:	
Iron angle and splice bars.	11.50 to 12.00
Iron arch bars, and transoms	11.50 to 12.00
Iron car axles	20.50 to 21.50
Steel car axles	14.50 to 15.00
No. 1 railroad wrought	9.00 to 9.50
No. 2 railroad wrought	9.25 to 9.75
No. 1 busheling	6.50 to 7.00
No. 2 busheling	5.50 to 6.00
Locomotive tires, smooth	13.00 to 13.50
Pipes and flues	6.50 to 7.00
Cupola Grades:	
No. 1 machinery cast	10.00 to 10.50
No. 1 railroad cast	9.00 to 9.50
No. 1 agricultural cast	8.50 to 9.00
Stove plate	7.50 to 8.00
Grate bars	7.00 to 7.50
Brake shoes	7.25 to 7.75

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

CLEVELAND

Ingot Output Undergoes Further Curtailment —Steel Demand Slow

CLEVELAND, Nov. 3.—Business in the heavier rolled steel products during October showed a slight gain over that of September. While the demand for steel bars tapered off slightly, this was more than offset by an increase in orders for structural shapes. Miscellaneous orders for sheets held up to the volume of the previous month, but the slowing down of the automotive industry in the Detroit territory was reflected in a falling off in orders from that source, and the aggregate business for the month apparently was somewhat below that of September.

Finished steel orders the past week showed no appreciable change. Nor is there any marked change in operations of consuming industries. While a few plants have increased their schedules, others have gone slightly backward. Consumers still are reducing stocks where possible and are buying in small lots for early needs.

One open-hearth furnace in Cleveland went out during the week and, with the open-hearth plant of one producer still shut down, operations by Cleveland plants have been reduced to 20 per cent of ingot capacity.

The Lake shipping season will be brought to a close earlier than usual. The iron ore movement by water this year will be approximately 47,000,000 tons, or less than during any previous year since 1924.

Prices on most products appear to be stabilized at recent levels. Weakness has developed on cold-finished steel bars, with concessions of $2 a ton.

Pig Iron

While sales and inquiry continue light, shipping orders have improved. November shipments are expected to show a moderate gain over those of October, when shipments fell below those of September. Better shipping orders have been released by some of the motor car manufacturers and makers of heating furnaces and stoves. Some manufacturers of heating equipment are preparing to get under production on advance orders for next season from mail order houses. A slight gain in shipping orders also is reported from some of the agricultural implement manufacturers. The Westinghouse Electric & Mfg. Co., which recently inquired for pig iron for its Cleveland plant, has purchased several hundred tons from three producers for its November-December requirements. The market appears to have a slightly firmer tone to the extent that concessions from $16, Lake furnace, on foundry and malleable iron, which were made recently to some competitive points, seem to have disappeared. Some business during the week brought out the $16 price. The maximum in northern Ohio and Indiana remains at $17. Prices are unchanged in Cleveland at $17.50 for local delivery and at $18 in Michigan.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25.	$17.50
S'th'n fdy., sil. 1.75 to 2.25.	$17.51 to 18.01
Malleable	17.50
Ohio silvery, 8 per cent	25.00
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; $3 from Jackson, Ohio; $6.01 from Birmingham.

Iron Ore

With the Lake shipping season rapidly drawing to a close, indications are that the total shipments by water will not exceed 47,000,000 tons. Early in the season it was estimated that the movement would reach 50,000,000 tons. Shipments by water during October were 5,531,285 tons, compared with 7,989,127 tons during October, last year. The total movement up to Nov. 1 was 44,595,294 tons, against 61,658,660 tons during the corresponding period last year, or a decrease of 27.2 per cent. Several shippers began laying up additional boats Nov. 1, and it is expected that with the exception of a few scattering cargoes the shipping season will be closed by Nov. 15.

Bars, Plates and Shapes

A fair volume of specifications for structural shapes came out during the week. Plates are not so active as structural material. The American Shipbuilding Co. took an order for a Lake dredge, requiring 700 tons of plates and shapes, and placed the steel. Demand for bars is very slow and apparently showing a downward tendency. A Cleveland mill will supply 460 tons of reinforcing bars for the Cleveland Stadium. Inquiry in the structural field is light. A large tonnage is involved in bridge projects in northern Ohio to be voted on at Tuesday's election.

Prices are steady at 1.60c., Cleveland, for steel bars for outside shipment and at 1.65c. for local delivery and 1.60c., Pittsburgh, for plates and shapes.

Sheets

The Chevrolet Motor Co. has issued specifications for a large tonnage of automobile body sheets for December shipment, and the Cleveland plant of the Fisher Body Corpn. is dividing this business among several mills. These orders probably will be all cleaned up today. The local Fisher Body plant has now got its production up to 15,000 unassembled Chevrolet bodies a week. The spread that has existed on auto body sheets for a week or two has disappeared, the 3.40c. price now being generally quoted. Auto body sheets are now $26 a ton lower than at this time a year ago based on the present price, which, with usual extras, is $75 a ton for 40 in. wide, 20-gage extra deep drawing quality and with the change in width extras that was made during the year.

Semi-Finished Steel

With reduced operations by some of the sheet mills, specifications for sheet bars have declined, and the local merchant producer has reduced operations to three open-hearth furnaces.

Track Supplies

The Chesapeake & Ohio Railroad has placed 11,000 tons of tie plates, which were divided among several mills, and 5000 kegs of spikes.

Wire Products

Demand for manufacturers' wire from bolt makers has improved slightly. Despite reports of concessions, car lot orders were taken during the week at the regular 2.30c. Cleveland price. Nails are weak, with a spread from $1.90 to $2 a keg. Some jobbers are reported to be naming the lower price.

Cold-Finished Steel Bars

Demand continues very light because of the inactivity of the automotive industry. Weakness has developed, with a concession of $2 a ton to 2c., Pittsburgh.

Old Material

Prices again have moved downward on steel-making and blast furnace grades and the market has a very weak tone. Difficulty in moving machine shop turnings has resulted in a decline of $1.50 a ton. Heavy melting steel is 25c. a ton lower.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$11.00 to $11.25
No. 2 heavy melting steel	10.50 to 10.75
Compressed sheet steel	10.50 to 11.00
Light bundled sheet stampings	9.00 to 9.25
Drop forge flashings	10.00 to 10.50
Machine shop turnings	5.00 to 5.50
Short shoveling turnings	7.75 to 8.00
No. 1 railroad wrought	13.00 to 13.50
No. 2 railroad wrought	14.00 to 14.50
No. 1 busheling	11.00 to 11.50
Pipes and flues	9.00 to 9.50
Steel axle turnings	12.50 to 13.00
Acid Open-Hearth Grades:	
Low phos., billet bloom and slab crops	17.50 to 18.00
Blast Furnace Grades:	
Cast iron borings	7.50 to 7.75
Mixed borings and short turnings	7.50 to 7.75
No. 2 busheling	6.75 to 7.00
Cupola Grades:	
No. 1 cast	13.00 to 13.50
Railroad grate bars	10.00 to 10.50
Stove plate	10.50 to 11.00
Rails under 3 ft.	16.00 to 16.50
Miscellaneous:	
Rails for rolling	16.25 to 16.50
Railroad malleable	15.00 to 15.50

NEW YORK

Blast Furnace Operations Continue to Be Curtailed—Steel Demand Slow

NEW YORK, Nov. 3.—Pig iron sales, at 7000 tons, compare with 4500 tons in the previous week and 7000 tons two weeks ago. Shipments have increased of late because of a bulge in barge deliveries from Buffalo and Port Henry, N. Y., necessitated by the approach of the end of the navigation season. It is doubtful whether the rate of foundry melt is undergoing any appreciable change. Some melters are known to be running out of iron and a fair volume of spot demand is therefore expected. With year-end inventory periods approaching and with prices still highly competitive, there is little incentive to buy ahead. A month to a month and a half ago, when a forward buying movement seemed to be in the making, some of the larger companies closed for considerable tonnage, particularly Southern iron, for deliveries extending into the first quarter, but with these exceptions buyers will carry comparatively little iron over into 1931.

Blast furnace operations continue to be curtailed. The Hanna Furnace Co. blew out its silvery stack at Buffalo last week and now has only one active furnace in that producing center. The Wickwire-Spencer Steel Co., Buffalo, will put out its active stack about Nov. 15. Two furnace interests report that the past week showed a reduction in their stocks, but it is, of course, too early to ascertain whether this is a mere flash in the pan or indicates a change in trend.

The Foran Foundry & Mfg. Co., Flemington, N. J., is in the market for 1500 tons of foundry iron for delivery over the next five months. With this exception, pending business in this immediate territory does not exceed 1500 tons. For shipment to Trenton, N. J., the National Radiator Corpn. is inquiring for 1000 tons.

Prices show no material change. Reports of concessions below $11, base, Birmingham, particularly on higher silicon Southern grades, are said to be accounted for by lower rail-and-water rates rather than by any further change in prices at furnace.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	$20.41 to $20.91
*Buff. No. 2, del'd east. N. J.	18.78 to 19.28
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	18.39 to 19.39
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	18.89 to 19.89

Freight rates: $4.91 from Buffalo, $1.39 to $2.52 from eastern Pennsylvania.
*Prices delivered to New Jersey cities having rate of $3.28 a ton from Buffalo.

Warehouse Business

Improved buying during the latter half of the month has brought the total of business in October to about the same level as in September. Prices are unchanged, but some shading continues. Sheet buying is moderately active, but concessions from quoted prices are not unusual.

Cast Iron Pipe

Inquiries for gas and water pipe for delivery through the winter and in the spring are beginning to appear from public utilities. Included are several thousand tons of gas and water pipe for subsidiaries of the United Gas Improvement Co., Philadelphia. Some inquiries are being issued earlier than usual, believed to be for the purpose of aiding in the improvement of the business situation. Another possible factor is the probability that cast iron pipe producers will be quite willing under present conditions to grant substantial concessions to buyers who will accept winter delivery. The market is unchanged at $36 to $37 a net ton, f.o.b. Northern foundry.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, $38.90 to $39.90; 4-in. and 5-in., $41.90 to $42.90; 3-in., $48.90 to $49.90. Class A and gas pipe, $3 extra.

Reinforcing Bars

The largest award of the week was 900 tons for foundations of the Lehigh Valley Railroad warehouse, New York, which was awarded to the Carroll-McCreary Co. C. A. Williams Co., Inc., has been given the general contract for foundations for a municipal penitentiary at Riker's Island, also requiring 900 tons.

For mill shipment, distributers of concrete bars quote 1.70c. a lb., Pittsburgh, on building and paving work, and 1.80c. on subway work (rail steel offered at $4 a ton less); for delivery from local stock, 2.35c. a lb., New York, up to 3.05c. a lb. for lots of less than 2 tons.

Coke

Foundry coke specifications are heavier, although improvement is not reported by all sellers. Colder weather may have stimulated shipments somewhat, although winter stocking of coke is not practiced by melters so much as formerly. Furnace coke prices range from $2.50 to $2.60 a net ton, Connellsville, while foundry coke quotations follow:

Special brands of beehive foundry coke, $4.70 to $4.85 a net ton, ovens, or $8.41 to $8.56 delivered to northern New Jersey, Jersey City and Newark, and $9.29 to $9.44 to New York and Brooklyn; by-product foundry coke, $9 to $9.40, Newark or Jersey City; $10.06, New York or Brooklyn.

Finished Steel

The news of steel trade developments is mostly of a negative character. The volume of orders in most lines seems to be smaller than at the beginning of October, and there are few prospects to indicate that an upturn in demand will come before January at the earliest. Even that prospect is by no means certain, but the general expectation is that the early part of the new year will bring some improvement, as it usually does.

Structural steel remains one of the bright spots of the situation. A large tonnage of prospective work is either being figured on or will be in the market before long, but actual lettings may be influenced by seasonal factors. Fabricators state, however, that postponements probably will mean a large volume of lettings in January and February in anticipation of spring building activities. Meanwhile, prices on structural shapes are the steadiest in a long time, and fabricated quotations also are subject to fewer fluctuations, although occasionally a large project brings out a surprisingly low price.

A prospective merger of large steel fabricating interests, regarding which no authoritative statement is yet available, has been the subject of discussion in the trade, especially as to its effect on Eastern plate mills which have shared in the plate business placed by the larger fabricating companies.

Old Material

No. 1 heavy melting steel continues to be bought at $12 a ton, delivered eastern Pennsylvania, or $8.50, New York, and brokers shipping by barge

(*Concluded on page* 1340)

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars, small shapes	3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Blue ann'l'd sheets (No. 10)	3.25c. to 3.40c.
Black sheets (No. 24*)	3.65c. to 3.75c.
Galvanized sheets (No. 24*)	4.25c.
Long terne sheets (No. 24)	5.80c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, ½ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open-hearth spring steel, bases,	4.50c. to 7.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	65
1 x 30 in. and smaller	65
Carriage bolts, cut thread:	
½ x 6 in. and smaller	65
¾ x 20 in. and smaller	65

Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.	$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

PHILADELPHIA

Pennsylvania to Buy 40,000 Tons of Steel for Cars

PHILADELPHIA, Nov. 3. — Steel mill operations continue at an average of less than 50 per cent of capacity. Plate, shape and bar prices are being maintained, with only occasional concessions on desirable tonnages of plates or shapes. Sheets, however, lack firmness, and concessions of $1 a ton from 2.35c., Pittsburgh, on black have been granted on substantial orders. Most projects requiring structural steel are small, but the total of such business is still providing a fair tonnage of work for fabricating shops, and some sizable contracts are expected to be placed in the next few weeks.

The Pennsylvania Railroad has not yet closed on about 40,000 to 45,000 tons of steel for 1500 gondola cars to be built in its Altoona, Lucknow and Pitcairn shops, and action has not yet been taken on its 1931 rail requirements. Award by the Philadelphia Electric Co. of a gas holder, requiring about 3200 tons of steel, is expected this week.

Pig Iron

Foundry requirements continue limited to carload lots except for an occasional inquiry covering first quarter shipment. The Foran Foundry & Machine Co., Flemington, N. J., is in the market for about 1500 tons of iron for next year. A Delaware River pipe maker is understood to have closed on about 10,000 tons of foundry iron with a Northern furnace. Southern furnaces are still keen competitors for business in eastern Pennsylvania, quoting $11.50 a ton, furnace, and at times waiving the usual differential for No. 2X foundry. Eastern Pennsylvania furnaces, however, continue to quote $18 to $18.50 on business in the immediate district.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	$18.76 to $19.26
East. Pa. No. 2X, 2.25 to 2.75	19.26 to 19.76
East. Pa. No. 1X	19.76 to 20.26
Basic (del'd east. Pa.)	17.75 to 18.25
Malleable	21.00
Stand. low phos. (f.o.b. east. Pa. furnace)	24.00
Cop. b'r'g low phos. (f.o.b. furnace)	23.00 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

Steel Bars

Demand is minor, but the price is firm at 1.60c. a lb., Pittsburgh, or 1.89c., delivered Philadelphia. Competition for reinforced concrete projects is active, particularly when a substantial tonnage of bars is required. Billet steel reinforcing bars range from 1.70c. to 1.75c., Pittsburgh, or 1.89c. to 1.94c., Philadelphia, and rail steel bars are quoted at about 1.55c., Franklin, Pa., or 1.84c., Philadelphia.

Shapes

Small contracts for bridge construction are being placed, but few building contracts are in the market at present. Shape prices are unchanged at 1.70c. a lb., f.o.b. nearest mill to consumer, or 1.76c., Philadelphia, with occasional concessions of $1 a ton to 1.65c., mill, or 1.71c., Philadelphia.

Plates

Although plate tonnage being booked by eastern Pennsylvania mills is small, the price is maintained at 1.70c., Coatesville, Pa., or 1.80½c., Philadelphia, with only occasional concessions of $1 a ton on sizable business. A large order for plates is expected to be placed this week by the Pennsylvania Railroad for 1500 gondola cars, which it will build in its own shops, and 2400 tons of plates will be required in a gas holder for the Philadelphia Electric Co.

Sheets

Only a few small orders are being booked from sheet consumers in this district. Prices of black and blue annealed sheets lack firmness. Galvanized sheets, after settling to 2.90c., Pittsburgh, or 3.29c., Philadelphia, show no further tendency to recede. Black sheets are quoted at 2.35c., Pittsburgh, or 2.64c., Philadelphia, and desirable orders have brought quotations $1 a ton lower. Blue annealed sheets, No. 13 gage, range from 2.05c. to 2.15c., Pittsburgh, or 2.34c. to 2.44c., Philadelphia, the higher price usually applying on the wider jobbing mill sizes. Blue annealed plates, No. 10 gage, range from 1.90c. to 2c., Pittsburgh, or 2.19c. to 2.29c., Philadelphia. Local consumers of sheets are continuing their previous operating schedules, especially the radio manufacturers, but current sheet requirements have been satisfied.

Imports

In the week ended Nov. 1, 2560 tons of chrome ore arrived at this port, of which 2000 tons was from Portuguese Africa and 560 tons from British South Africa. A total of 326 tons of pig iron was received from British India. Steel arrivals consisted of 113 tons of structural shapes from Germany and two tons of drill steel from Sweden.

Old Material

Except for purchases by dealers to complete contracts, all grades of scrap are inactive. Brokers point out that the sale last week of about 5000 tons of No. 1 heavy melting steel to a consumer at Bethlehem, Pa., at $11.50, delivered, was equivalent to $12.50 a ton to any other eastern Pennsylvania point from the New Jersey yard where the scrap is located. The freight rate from this point to Bethlehem, Pa., is $1.89 a ton, compared with a rate of $2.90 to other eastern Pennsylvania consumers. A Phoenixville, Pa., user of No. 2 steel, machine shop turnings and stove plate has received an oversupply of the first two grades and suspended deliveries on its contracts, but is still accepting stove plate at $9.50 a ton, delivered.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	$11.50 to $12.50
No. 2 heavy melting steel	10.00
Heavy melting steel (yard)	9.50
No. 1 railroad wrought	14.00
Bundled sheets (for steel works)	9.00
Hydraulic compressed, new	10.00 to 11.00
Hydraulic compressed, old	9.00 to 9.50
Machine shop turnings (for steel works)	7.50 to 8.50
Heavy axle turnings (or equiv.)	10.50 to 11.00
Cast borings (for steel works and roll. mill)	8.50
Heavy breakable cast (for steel works)	11.50
Railroad grate bars	9.50
Stove plate (for steel works)	9.50
No. 1 low phos., hvy., 0.04% and under	19.00 to 20.00
Couplers and knuckles	16.50 to 17.50
Rolled steel wheels	16.50 to 17.50
No. 1 blast f'nace scrap	7.50
Wrot. iron and soft steel pipes and tubes (new specific.)	12.00
Shafting	18.00 to 18.50
Steel axles	20.50 to 21.00
No. 1 forge fire	11.00
Cast iron carwheels	15.00
No. 1 cast	12.00 to 12.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rails for rolling	13.50 to 14.00

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq., twisted and deform.	2.50c. to 2.60c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to ⅛-in. inclu.	2.90c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.60c.
†Galvanized sheets (No. 24)	4.15c.
Light plates, blue annealed (No. 10)	3.05c.
Blue ann'l'd sheets (No. 13)	3.20c.
Diam. pat. floor plates, ¼-in.	5.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

Joseph Schonthal Co., Columbus, Ohio, has purchased the property of the former Scioto Valley Railway & Power Co., consisting of rails, rolling stock, power house and equipment. About 70 miles of rails consisting of 70 lb. running rail and 100 lb. third rail will be torn up and sold.

BOSTON

Pig Iron Sales Larger, But Market Is Not Active

BOSTON, Nov. 3.—Due to the activities of the Mystic Iron Works, pig iron sales showed a sizable increase over those of the previous week. But the market is by no means active, because New York State, Alabama and eastern Pennsylvania furnaces did very little business. Although No. 2 plain, No. 2X and No. 1X Buffalo iron is still obtainable in attractive tonnages at $15.50 a ton, furnace, the little Buffalo iron sold the past week was at $16 a ton, furnace, for No. 2X and at $16.50 for No. 1X. Furnaces east of Buffalo did not have to go below the equivalent delivered basis to obtain orders. There are no inquiries of importance in the market.

Foundry iron prices per gross ton deliv'd to most New England points:

†Buffalo, sil. 1.75 to 2.25	$19.78 to $20.28
†Buffalo, sil. 2.25 to 2.75	19.78 to 20.28
*Buffalo, sil. 1.75 to 2.25	20.41 to 20.91
*Buffalo, sil. 2.25 to 2.75	20.91 to 21.41
Va., sil. 1.75 to 2.25	25.21
Va., sil. 2.25 to 2.75	25.71
*Ala., sil. 1.75 to 2.25	21.11
*Ala., sil. 2.25 to 2.75	21.61
†Ala., sil. 1.75 to 2.25	17.25
†Ala., sil. 2.25 to 2.75	17.75

Freight rates: $4.91 all rail and $4.28 rail and water from Buffalo; $5.21 all rail from Virginia; $9.61 all rail from Alabama and $5.75 rail and water from Alabama to New England seaboard.
*All rail rate.
†Rail and water rate.

Cast Iron Pipe

Business the past week was confined to car lots, with $36 a ton, foundry, for 6-in. and larger stock, the prevailing price. Attleboro, Mass., will soon be in the market for $30,000 worth of 12-in. pipe. Westboro, Mass., has appropriated $10,000 and Pittsfield, Mass., $20,000 for water mains.

Fabricated Steel

It is expected that the General Electric Co. will award 1350 tons of steel this week for its Pittsfield, Mass., transformer manufacturing plant, and that a Saylesville, R. I., finishing mill will let 360 tons. New business is developing slowly, competition among fabricators for tonnage is keen, and some low prices are being made.

Old Material

Little scrap was sold the past week, consequently there was little opportunity for prices to change. The undertone of the market is still very unsettled, especially for No. 1 heavy melting steel and No. 1 machinery cast. Many brokers and yards some months ago loaded up with machinery cast in anticipation of buying by Pennsylvania mills and New England foundries. No appreciable demand has appeared, however, and carrying charges are mounting rapidly. One of the strongest concerns is holding out for $12.50 to $13 a ton, delivered New England consuming points, but most offers are at $11.50 to $12.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$7.85 to $8.10
Scrap T rails	7.85 to 8.10
Scrap girder rails	6.85 to 7.10
No. 1 railroad wrought	8.00 to 8.50
Machine shop turnings	3.10 to 3.60
Cast iron borings (steel works and rolling mill)	3.10 to 3.60
Bundled skeleton, long	6.00 to 6.50
Forge flashings	6.00 to 6.50
Blast furnace borings and turnings	2.75 to 3.10
Forge scrap	5.50 to 6.50
Shafting	13.00 to 14.00
Steel car axles	16.00 to 18.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	7.00 to 7.50
Rails for rolling	10.00 to 10.25
Cast iron borings, chemical	9.00 to 9.50
Prices per gross ton deliv'd consumers' yards:	
Textile cast	$11.00 to $11.50
No. 1 machinery cast	11.50 to 12.50
No. 2 machinery cast	10.00 to 10.50
Stove plate	8.00 to 8.50
Railroad malleable	14.00 to 14.50

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.365c.
Soft steel bars, small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex	3.50c. to 5.55c.
Squares and flats	4.00c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.50c.
	Per Cent Off List
Machine bolts	60 and 5
Carriage bolts	60 and 5
Lag screws	60 and 5
Hot-pressed nuts	60 and 5
Cold-punched nuts	60 and 5
Stove bolts	70 and 10

BIRMINGHAM

Pig Iron Business Holding Its Own —Steel Buying Gains Slightly

BIRMINGHAM, Nov. 3.—New business in the pig iron market about held its own in the last week so far as orders for quick delivery were concerned. These lead in the volume of sales over contract business, which is becoming less frequent, as most of the larger consumers have covered for November and many for December. Shipping instructions recovered some last week from the dull week preceding. One company reported more iron moved last week than during any other week in October. In one or two instances some iron was added to producers' stocks in October, but on the whole these stocks are estimated to be about the same as 30 days ago. Prices are steady at $14, base Birmingham, for district delivery.

For the fifth successive week, active furnaces have totaled 10. Eight of these are on foundry iron and two on basic iron.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$14.00
No. 1 fdy., 2.25 to 2.75 sil.	14.50
Basic	14.00

Finished Steel

New business last week maintained the lead established two weeks ago. This increase in sales was not large, but it helped to bring out a noticeable gain in the aggregate bookings for October as compared with September. Inquiries have not increased in a measure comparable with sales. No changes in prices were reported last week. Sheet and wire mill operations are on a better basis than in some time, though they do not compare with the high rate of a year ago.

The Gulf States Steel Co. is operating four open-hearths, an increase of one, preparatory to taking another off in the next few days for rebuilding. The Tennessee company continues to work five out of eight at Fairfield, while all nine at Ensley remain idle. This makes a total of nine active open-hearths out of 23.

Structural steel fabricators report demand from bridge construction sources to be holding fairly well, but the demand from other sources is the lightest of any time this year. New orders of the Virginia Bridge & Iron Co. include 350 tons for two bridges for Alabama, Tennessee & Northern Railroad, 150 tons for a bridge at Fort Worth, Tex., and 100 tons for a bridge in Montgomery County, Tenn. The Nashville Bridge Co. has booked 150 tons for a bridge at San Mateo, Fla. Reinforcing bar demand is meager.

Cast Iron Pipe

Bookings were of light order last week, though books were opened on a few good projects on which announcements of awards are expected at any time. Small orders have been running fairly well recently, most of them being for completion of municipal construction programs. Improved inquiry is reported from industrial sources, but only small tonnages are involved. An important project at Lebanon, Tenn., has been further postponed until early December. New Orleans will take bids Dec. 3 on a round tonnage of 24, 30 and 48-in. pipe. Additional work is reported in sight at Memphis, Tenn. Operations continue at the same rate, but backlogs at the beginning of November are below those of 30 days ago. Prices are maintaining a fair degree of firmness at 37 to $38, Birmingham.

Coke

The movement of foundry coke shows no change from the light average of the past few weeks. October shipments are estimated to have been slightly below those of September. Merchant producers are holding to

slow coking operations in some instances to keep from adding to stocks already burdensome. Quotations remain at $5, base Birmingham.

Old Material

Light buying continues. The movement of iron scrap showed a little improvement for October as compared with September, but the movement of steel scrap declined from the average of the 30 days preceding. Quotations are unchanged, prices being nominal in some instances.

Prices per gross ton deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	$10.00 to $11.00
Scrap steel rails	12.50
Short shoveling turnings	9.25
Cast iron borings	9.00
Stove plate	9.50
Steel axles	20.50 to 21.00
Iron axles	21.00
No. 1 railroad wrought	10.00
Rails for rolling	11.50 to 12.00
No. 1 cast	11.50
Tramcar wheels	11.50
Cast iron borings, chem.	13.50
Cast iron carwheels	11.00

YOUNGSTOWN — Valley Mills Expect No Further Curtailment of Production

YOUNGSTOWN, Nov. 3.—Aggregate tonnage releases of Valley mills during October were in about the same volume as in the preceding month, but, as October has two additional working days, the daily rate declined slightly. Improvement can hardly be looked for this month, but Valley mills foresee no further curtailment. It is generally believed that inventories of consuming companies are at a minimum and the hand-to-mouth character of buying seems to preclude a further decrease in current requirements. Based upon the same theory, Youngstown companies do not look for as pronounced a year-end decline in specifications as has been the case formerly, because the old excuse of inventory reduction can hardly be used.

Mills in this district are now fairly well adjusted to the depleted requirements of their principal consuming industry and, without the usual flow of steel to the automobile industry, have been able to hold production to about 50 per cent of capacity. In fact, sheet production by one large company was close to 60 per cent last week, but specifications during the period did not justify a corresponding rate for the present week. In some cases, however, releases received on Monday and Tuesday affect rolling schedules in the same week and unless it has been definitely decided previously to shut down a mill entirely for a week or fortnight period, the day-to-day fluctuations in demand are immediately reflected in finishing mill operations. The urgency of deliveries is illustrated by the fact that express shipments are not uncommon and customers generally are uncompromising in their demands upon mills for 100 per cent service.

Raw steel production in the Valleys is holding at about 50 per cent of capacity, a figure which has been approximated for a number of weeks. Open-hearth furnaces are not being pushed in any instances, and a decline to about 35 per cent by one large maker in the past week indicates some further adjustment to finishing mill demands. Blast furnace activity also continues fairly stable, the blowing in of a Hubbard furnace last month by the Youngstown Sheet & Tube Co. having been offset by blowing out of a stack in the Campbell group. No strictly merchant stacks are blowing, and steel company accumulations of pig iron have been kept small.

Steel consuming industries in the Youngstown district are running at a somewhat better rate than the steel mills. Fabricators of tanks and other steel plate equipment for the oil industry are fairly busy and makers of building products and office furniture have curtailed production only in a limited way.

The activity of pipe mills is aiding considerably in the maintenance of the present rate of activity in the steel industry. The three electric welding units of the Republic Steel Corpn. are fully utilizing that company's skelp capacity, and production is being increased gradually in the new welding mill of the Youngstown Sheet & Tube Co. All of these mills have sufficient business to keep them occupied at the present rate over the remainder of the year. Sheet production ranges from 40 to 60 per cent from week to week with a monthly average of about 50 per cent. Hot-rolled strip is slightly better, while cold-rolled will average about 35 per cent. The operating rate of both the Steel Corporation and independent bar mills is under 50 per cent and apparently is still declining.

With the exception of a few glaring weak spots, the price structure has shown no appreciable change. Nails have declined to $1.95, Pittsburgh, and have been sold at less to large jobbers. Plain wire is not quotably lower, although subject to shading. The current maximum quotation on galvanized sheets is 3c., Pittsburgh, and jobbers have been able to buy at 2.90c. In exceptional cases, quotations as low as 2.95c., Pittsburgh, have been made to the trade. On the remainder of sheet mill products, recent price ranges of $2 a ton still represent the market, with mills continuing to quote the higher figure until forced to recognize lower prices by competition. Black sheets stand at 2.35c. to 2.45c.; blue annealed at 2.05c. to 2.15c.; light plates at 1.90c. to 2c., and automobile body at 3.40c. to 3.50c. Bars are unchanged at 1.60c. to 1.65c., Pittsburgh, although plates at 1.60c. are subject to not infrequent shading. With pipe mills taking a large part of their plate production, Valley mills are not competing very actively in the plate market for this reason. Hot-rolled strip is quotable at 1.60c. to 1.65c., Pittsburgh, for the wider sizes, with the usual $2 a ton premium applying on the narrower widths. Shading of this commodity is reported from time to time, but not frequently. The market on cold-rolled strip is holding at a minimum of 2.35c., Pittsburgh or Cleveland.

Weakness in the market on basic materials is an unfavorable factor, but declining pig iron and scrap prices have not been reflected in semi-finished steel, which is still nominally quoted at $31, Youngstown, for billets, slabs and sheet bars. While non-integrated users complain of adherence to this figure because of declines in finished products, the larger companies do not seem disposed to pass along the advantage. In the immediate Valley district, pig iron prices are holding at $17, furnace, for foundry and basic iron and at $17.50 for malleable and Bessemer. When forced to meet Pittsburgh, Cleveland and Buffalo competition in competitive territory, these quotations are naturally shaded. Valley scrap prices have reflected the recent sharp decline in Pittsburgh, and railroad heavy melting steel destined for local mills has been sold at as low as $14. Hydraulic compressed sheets are lower, with $13.75 representing the top of the market.

BUFFALO — Ingot Operation Off Slightly and Many Decline Further—Pig Iron and Scrap Dull

BUFFALO, Nov. 3.—Pig iron inquiry totals about 2000 tons, all for prompt shipment. There is a little better accumulation of shipping orders. Most of the producers are planning to make their final shipments on the barge canal next week. The Hanna Furnace Co. has taken its "B" furnace out of blast. This leaves five active furnaces in this district.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	$17.50
No. 2X fdy., sil. 2.25 to 2.75	18.00
No. 1 fdy., sil. 2.75 to 3.25	19.00
Malleable, sil. up to 2.25	18.00
Basic	17.50
Lake Superior charcoal	27.28

Finished Steel

Ingot operation in this district has been decreased by one open-hearth furnace, with the possibility that another will be taken off within a week. The Lackawanna plant of the Bethlehem Steel Co. is operating 14 of 24, as against 15 last week. The Donner plant of the Republic Steel Corpn. is operating four open-hearths; Wickwire-Spencer, two.

Old Material

Dealers who recently participated in a 10,000-ton order for heavy melt-

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.25c.
Soft steel bars	3.15c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.65c.
Rounds and hex.	3.15c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.60c.
Bands	3.50c.
Hoops	3.90c.
Blue ann'l'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$2.60
Black wire, base per 100 lb.	3.20

ing scrap are having little difficulty in filling. There are no signs of any stiffening. Yard operations are at a minimum.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$12.50
No. 2 heavy melting scrap	11.00
Scrap rails	$12.00 to 12.50
Hydraul. comp. sheets	10.50 to 11.00
Hand bundled sheets	8.00 to 8.50
Drop forge flashings	10.50 to 11.00
No. 1 busheling	10.50 to 11.00
Hvy. steel axle turnings	11.00 to 11.50
Machine shop turnings	6.00 to 7.00
No. 1 railroad wrought	10.00 to 10.50
Acid Open-Hearth Grades:	
Knuckles and couplers	14.50 to 15.00
Coil and leaf springs	14.50 to 15.00
Rolled steel wheels	14.50 to 15.00
Low phos. billet and bloom ends	15.50 to 16.00
Electric Furnace Grades:	
Short shov. steel turnings	8.50 to 9.50
Blast Furnace Grades:	
Short mixed borings and turnings	7.00 to 8.00
Cast iron borings	7.00 to 8.00
No. 2 busheling	7.00
Rolling Mill Grades:	
Steel car axles	15.00 to 15.50
Iron axles	19.00 to 19.50
Cupola Grades:	
No. 1 machinery cast	11.00 to 11.50
Stove plate	10.00 to 10.50
Locomotive grate bars	8.25 to 9.25
Steel rails, 2 ft. and under	15.00 to 15.50
Cast iron carwheels	13.50 to 14.00
Malleable Grades:	
Industrial	14.00 to 14.50
Railroad	14.00 to 14.50
Agricultural	14.00 to 14.50
Special Grades:	
Chemical borings	11.50 to 12.00

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shafting, screw stock	3.60c.
Black sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	4.60c.
Blue ann'l'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.10c.
Galv. corrug. sheets	4.70c.
Structural rivets	4.15c.
Boiler rivets	4.15c.
	Per Cent Off List
Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50

ST. LOUIS

Pig Iron Shipments Gained in October—Scrap Shows Further Weakness

ST. LOUIS, Nov. 3.—Shipping orders against contracts for pig iron continued to show improvement, and last week were heavier than for any similar period for some time, according to the St. Louis Gas & Coke Corpn., whose shipments in October exceeded those of September. This is regarded as favorable to buying in the future, although very little new business is being placed at this time. Consumers of basic iron in the St. Louis district are marking time. The melt of malleable iron is said to be low, because melters are waiting for shipping orders for castings already made for the automobile trade before manufacturing more products. The stove interests report a seasonal increase in their melt. Prices are unchanged.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., deliv'd St. Louis	19.66
Southern No. 2 fdy., deliv'd	$15.92 to 16.42
Northern malleable, deliv'd	19.16 to 19.66
Northern basic, deliv'd	19.16 to 19.66

Freight rates: 75c. (average) Granite City to St. Louis; $2.16 from Chicago; $4.42 from Birmingham.

Finished Steel

Local steel sellers find prices somewhat firmer and mills making a more determined effort to maintain present price levels, also that buyers realize prices may not go lower in view of the many unsatisfactory earning statements published recently. Quite a number of buyers are interested in first quarter contracts.

Old Material

The scrap market is weaker, with No. 1 and No. 2 heavy melting steel 25c. a ton off. Most of the other items also are lower. The fact that consumers are buying very little and give no indication of being in the market for any considerable tonnage soon is the principal cause of the weakness in the market, but there are aggravations, such as the tendency of some mills to withhold shipments on scrap already contracted for and on which dealers have covered and the action of some railroads in inserting a clause in contracts for the sale of old material specifying that shipments must be made immediately and that no hold-ups will be permitted, making it more difficult for dealers to operate. There is virtually no demand for relaying rails.

Railroad lists: Baltimore & Ohio, 9335 tons; Missouri Pacific, 5000 tons; Chicago & North Western, 4500 tons; Missouri-Kansas-Texas, 1700 tons; St. Louis-San Francisco, 84 carloads; Nashville, Chattanooga & St. Louis, 8 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel	$11.00 to $11.50
No. 1 heavy melting or shoveling steel	10.00 to 10.50
No. 2 heavy melting or shoveling steel	9.25 to 9.75
No. 1 locomotive tires	11.50 to 12.00
Misc. stand-sec. rails including frogs, switches and guards, cut apart	11.00 to 11.50
Railroad springs	13.00 to 13.50
Bundled sheets	6.50 to 7.00
No. 2 railroad wrought	10.00 to 10.50
No. 1 busheling	7.00 to 7.50
Cast iron borings and shoveling turnings	6.25 to 6.75
Iron rails	10.00 to 11.00
Rails for rolling	12.50 to 13.00
Machine shop turnings	3.50 to 4.00
Heavy turnings	8.00 to 8.50
Steel car axles	15.50 to 16.00
Iron car axles	20.50 to 21.00
Wrot. iron bars and trans.	13.00 to 13.50
No. 1 railroad wrought	8.00 to 8.50
Steel rails, less than 3 ft.	13.00 to 13.50
Steel angle bars	10.50 to 11.00
Cast iron carwheels	11.00 to 11.50
No. 1 machinery cast	10.50 to 11.00
Railroad malleable	10.25 to 10.75
No. 1 railroad cast	10.00 to 10.50
Stove plate	8.50 to 9.00
Relay. rails, 60 lb. and under	16.00 to 16.50
Relay. rails, 70 lb. and over	20.00 to 21.00
Agricult. malleable	10.00 to 10.50

CINCINNATI

Pig Iron and Steel Demands Show No Gains—Scrap Dull

CINCINNATI, Nov. 3. — Continued apathy on the part of district consumers of pig iron resulted last week in a decline in the volume of bookings by district furnace representatives. Total sales were 1700 tons, all for spot shipment. Inquiry also is lacking. While there has been little to test prices during the last month, Southern iron appears to be steady in this district at the present quotation of $11.50, base Birmingham. Foundries are operating on short time, and foundrymen say that no improvement is expected before the middle of the first quarter.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	$20.89 to $21.39
Ala. fdy., sil. 1.75 to 2.25	15.19 to 16.19
Ala. fdy., sil. 2.25 to 2.75	15.69 to 16.69
Tenn. fdy., sil. 1.75 to 2.25	15.19 to 16.19
S'th'n Ohio silvery, 8 per cent	24.39

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

Finished Steel

Fresh bookings of district sheet manufacturers last week equaled the total of the preceding week. The

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
New billet reinforc. bars	3.15c.
Rail steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.35c.
Cold-fin. rounds and hex.	3.80c.
Squares	4.30c.
Black sheets (No. 24)	4.05c.
Galvanized sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.45c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (25 kegs or more)	2.95
Cement c't'd nails, base 100 lb. keg	2.95
Chain, per 100 lb.	10.25
	Net per 100 Ft.
Lap-welded steel boiler tubes, 2-in.	$16.50
4-in.	34.50
Seamless steel boiler tubes, 2-in.	17.50
4-in.	36.00

demand, however, lacks indications of improving. Orders are being held to immediate requirements. Production schedules for this week have not been changed. The general rate of district mills is less than 50 per cent, although one unit of the leading interest is well above the average.

Old Material

While scrap dealers report a better feeling in the trade, demand does not indicate a change in the market. Dealers are buying conservatively. Dealers' prices remain unchanged, with no business to test them.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	$10.25 to $10.75
Scrap rails for melting	11.50 to 12.00
Loose sheet clippings	6.50 to 7.00
Bundled sheets	9.25 to 9.75
Cast iron borings	5.50 to 6.00
Machine shop turnings	6.00 to 6.50
No. 1 busheling	8.50 to 9.00
No. 2 busheling	5.50 to 6.00
Rails for rolling	12.00 to 12.50
No. 1 locomotive tires	13.00 to 13.50
No. 2 railroad wrought	10.25 to 10.75
Short rails	15.75 to 16.25
Cast iron carwheels	11.50 to 12.00
No. 1 machinery cast	14.50 to 15.00
No. 1 railroad cast	12.50 to 13.00
Burnt cast	7.00 to 7.50
Stove plate	7.00 to 7.50
Brake shoes	7.00 to 7.50
Agricultural malleable	12.50 to 13.00
Railroad malleable	13.50 to 14.00

Detroit Scrap Market Continues Weak

DETROIT, Nov. 3.—Except for a few items, scrap quotations have remained at last week's levels. However, the price structure is weak. Steel grades have been sustained principally by purchases for water shipment to Buffalo before the Lake navigation season closes. Otherwise, consumer buying is virtually at a standstill.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	$10.00 to $10.50
Borings and short turnings	4.50 to 5.00
Long turnings	4.00 to 4.50
No. 1 machinery cast	10.00 to 10.50
Automotive cast	11.75 to 12.25
Hydraul. comp. sheets	10.00 to 10.50
Stove plate	7.50 to 8.00
New No. 1 busheling	8.75 to 9.25
Old No. 2 busheling	4.00 to 4.50
Sheet clippings	7.25 to 7.75
Flashings	9.00 to 9.50

Western Electric Reports Large September Sales

Sales by the Western Electric Co. in September were the largest in the history of the company for that month and were well over $5,000,000 in excess of sales in September, 1929.

The company has announced that it has shortened hours of operation in order to keep the maximum number of trained employees at work. Moderate deductions in working hours have been made in the manufacturing forces at the Hawthorne works, Chicago, the Kearny works in New Jersey, and the Point Breeze works in Baltimore.

PACIFIC COAST

SAN FRANCISCO, Nov. 1—(*By Air Mail*).—Little or no improvement in demand for steel products on the Pacific Coast is noted this week. With the exception of plates, awards this week were light.

The Western Pipe & Steel Co. has booked a pipe line for San Francisco, calling for 5000 tons of plates. Bids have been opened on several fair-sized structural shape projects, the largest involving 3200 tons for a bridge in British Columbia.

Bars

Only one award of 100 tons or more was reported in the reinforcing steel bar market. This involved 100 tons for a jail building in Ventura, Cal., placed with an unnamed interest. A fair volume of pending business is expected to be closed within the next 10 days. Bids were opened on 2000 tons for the Burrard Street bridge, Vancouver, B. C., and on 402 tons for highway work at Burley, Idaho. Prices on out-of-stock material in San Francisco and Los Angeles remain at 2.50c., base, on carload lots. Merchant bar material is weak at 2.10c., c.i.f.

Plates

While only one plate award of importance was noted, that mentioned above, bids have been opened on 600 tons for 11,458 ft. of 30-in. pipe for Tacoma, Wash., and on 1700 tons for a 38 to 54-in. welded steel pipe line for Los Angeles. The East Bay Municipal Utility District, Oakland, will open bids Nov. 3 on 390 tons of ¼ in. plate for a 24-in. welded steel pipe line. The range in price continues at 2.05c. to 2.15c., c.i.f.

Structural Shapes

The structural steel market is active. Awards are not especially heavy, but considerable new work is being planned. Among the larger lots booked were 200 tons for a factory for Rheems Mfg. Co., South Gate, Cal., and 160 tons for a new jail in Ventura, both secured by the McClintic-Marshall Co. Bids have been opened on 3200 tons for the Burrard Street bridge in Vancouver, B. C., and on 1500 tons for a theater in Oakland. New inquiries include 4000 tons of plain material for the Pacific Fruit Express Co., San Francisco, and 400 tons for a new lighting plant in Pasadena, bids on the latter to be opened Nov. 14. Prices on shapes continue at 2.15c. to 2.25c., c.i.f.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	3.40c.
Soft steel bars	3.40c.
Black sheets (No. 24)	4.35c.
Blue ann'l'd sheets (No. 10)	3.80c.
Galv. sheets (No. 24)	5.00c.
Struc. rivets, ½-in. and larger	5.00c.
Com. wire nails, base per keg	$3.35
Cement c't'd nails, 100 lb. keg	3.35

San Francisco Pipe Line Calls for 5000 Tons of Plates

Pig iron prices per gross ton at San Francisco:

*Utah basic	$22.00 to $24.00
*Utah fdy., sil. 2.75 to 3.25	22.00 to 24.00
**Indian fdy., sil. 2.75 to 3.25	22.00 to 24.00

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Cast Iron Pipe

An unnamed interest took 189 tons of 2 to 8-in. Class C pipe for San Diego, Cal. Alhambra, Cal., will open bids on Nov. 5 on 105 tons of 4 to 8-in. Class B pipe and Renton, Wash., will open bids Nov. 4 on 134 tons of 10-in. Class B pipe. Eureka, Cal., will come into the market shortly for 100 tons, former bids having been rejected.

Railroad Equipment

Pennsylvania to Build 1500 Cars —Santa Fe Inquires

THE Pennsylvania Railroad has announced that it will build 1500 65½-ft. heavy gondola cars in its own shops. These cars will take about 45,000 tons of steel. The Baltimore & Ohio, which recently stated that it would build 2000 cars, has awarded a contract to the Standard Steel Car Co. for 1000 box car bodies, and is expected to do the remainder of the work in its own shops. The Atchison, Topeka & Santa Fe has inquired for 2300 freight cars. Other items of the week follow:

Wheeling Steel Corpn. has ordered the repair of 20 gondola cars in shops of Pressed Steel Car Co.

Hercules Cement Corpn. has ordered 10 cement cars from Standard Steel Car Co.

Illinois Terminal Railroad has ordered 15 steel underframes from American Car & Foundry Co.

New York Central is in the market for 20 multiple unit car bodies and trucks for passenger cars.

Santa Fe is taking prices on 1000 box, 500 automobile, 500 refrigerator, 300 hopper, 22 caboose, 10 drovers' caboose, 10 horse-express and eight lounge and parlor cars.

New York City and the Interborough Rapid Transit Co. will buy 289 subway cars under a cooperative financing plan. Bids will close Nov. 15.

A special die nipple used by a picked crew of oil workers to shut in a monster wild well, which for a few days threatened the partial destruction of Oklahoma City, Okla., was forged, machined and assembled by the American Iron & Machine Works Co., Oklahoma City, according to information received from the company by telegraph on Monday.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	$31.00
Rerolling, 4-in. and under 10-in., Youngstown	31.00
Rerolling, 4-in. and under 10-in., Cleveland	31.00
Rerolling, 4-in. and under 10-in., Chicago	32.00
Forging quality, Pittsburgh	36.00

Sheet Bars

(Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$31.00
Youngstown	31.00
Cleveland	31.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$31.00
Youngstown	31.00
Cleveland	31.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.60c. to 1.70c.
Universal	1.60c. to 1.70c.
Sheared	1.60c. to 1.70c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$36.00
Cleveland	36.00
Chicago	37.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria	8c. to 9c.
Iron ore, low phos., Swedish, average 68% iron	11c.
Iron ore, basic Swedish, average 65% iron	9c.
Manganese ore, washed 52% manganese, from the Caucasus	26c. to 28c.
Manganese ore, Brazilian, African or Indian, basic 50%	26c. to 28c.
Tungsten ore, high grade, per unit, in 60% concentrates	$12.00 to $14.00
	Per Gross Ton
Chrome ore, 45 to 50% Cr_2O_3 crude, c.i.f. Atlantic seaboard	$22.00 to $24.00
	Per Lb.
Molybdenum ore, 85% concentrates of MoS_2 delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.60
Foundry, f.o.b. Connellsville prompt	3.25 to 4.75
Foundry, by-products, Ch'go ovens	8.00
Foundry, by-products, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.25 to $1.35
Mine run coking coal, f.o.b. W. Pa. mines	1.40 to 1.50
Gas coal, ¾-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	.35 to .55
Gas slack, f.o.b. W. Pa. mines	.90 to 1.00

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	$94.00 to $99.00
Foreign, 80%, Atlantic or Gulf port, duty paid	94.00 to 99.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$31.00 to $33.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$83.50
75%	130.00

	Per Gross Ton Furnace		*Per Gross Ton Furnace*
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	39.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$26.50	13%	$32.50
11%	28.50	14%	34.50
12%	30.50	15%	37.00

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$21.00	11%	$24.00
7%	21.50	12%	25.00
8%	22.00	13%	27.00
9%	22.50	14%	29.00
10%	23.00	15%	31.00

Delivered prices at Chicago are about 50c. a ton below this schedule.

Other Ferroalloys

Ferrotungsten, per lb. contained metal del'd	$1.30 to $1.40
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton	$91.00
Ferrophosphorus, electric 24%, f.o.b. Anniston, Ala., per gross ton	$122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	$18.00
No. 2 lump, Illinois and Kentucky mines	20.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	$17.00 to $17.50
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick

	Per 1000 f.o.b. Works High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$43.00 to $46.00	$35.00 to $38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00	.....
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	$8.50 to 10.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	73
†Carriage bolts	73
Lag bolts	73
Plow bolts, Nos. 1, 2, 3 and 7 heads	73
Hot-pressed nuts, blank or tapped, square	73
Hot-pressed nuts, blank or tapped, hexagons	73
C.p.c. and t. square or hex. nuts, blank or tapped	73
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including ⅜ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	73
Semi-finished hexagon castellated nuts, S.A.E.	73
Stove bolts in packages, P'gh	80, 10, 10 and 5
Stove bolts in packages, Chicago	80, 10, 10 and 5
Stove bolts in packages, Cleveland	80, 10, 10 and 5
Stove bolts in bulk, P'gh	80, 10, 10, 5 and 2½
Stove bolts in bulk, Chicago	80, 10, 10, 5 and 2½
Stove bolts in bulk. Cleveland	80. 10, 10, 5 and 2½
Tire bolts	60, 10 and 10

Discounts of 73 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.75
F.o.b. Chicago	2.85

Small Rivets

(⅞-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S. thread	85 and 10
Upset hex. cap screws, S.A.E. thread	85 and 10
Upset set screws	80, 10 and 5
Milled studs	70

▲▲▲ Mill Prices of Finished Iron and Steel Products ▲▲▲

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c. to 1.65c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.89c. to 1.94c.
Del'd New York	1.93c. to 1.98c.
F.o.b. Cleveland	1.60c. to 1.65c.
F.o.b. Lackawanna	1.70c. to 1.75c.
F.o.b. Birmingham	1.80c.
C.i.f. Pacific ports	2.10c.
F.o.b. San Francisco mills	2.25c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.	1.70c. to 1.75c.
F.o.b. Birmingham, mill lengths	1.80c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.55c.
F.o.b. Chicago Heights mill	1.65c.
Del'd Philadelphia	1.84c. to 1.89c.

Iron

Common iron, f.o.b. Chicago	1.70c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.09c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c. to 1.75c.
F.o.b. Birmingham	1.80c.
Del'd Cleveland	1.78½c.
Del'd Philadelphia	1.80½c. to 1.85½c.
F.o.b. Coatesville	1.70c.
F.o.b. Sparrows Point	1.70c.
F.o.b. Lackawanna	1.70c.
Del'd New York	1.88c.
C.i.f. Pacific ports	2.05c. to 2.15c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c. to 1.75c.
F.o.b. Birmingham	1.80c.
F.o.b. Lackawanna	1.70c. to 1.75c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.78½c.
Del'd Philadelphia	1.71c. to 1.76c.
Del'd New York	1.85½c.
C.i.f. Pacific ports	2.15c. to 2.25c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh	1.70c.
Wider than 6 in., P'gh	1.60c.
6 in. and narrower, Chicago	1.80c.
Wider than 6 in., Chicago	1.70c.
Cooperage stock, P'gh	1.90c.
Cooperage stock, Chicago	2.00c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.00c. to 2.10c.
Bars, f.o.b. Chicago	2.00c. to 2.10c.
Bars, Cleveland	2.00c. to 2.10c.
Bars, Buffalo	2.00c. to 2.10c.
Shafting, ground, f.o.b. mill	*2.45c. to 3.40c.
Strips, P'gh	2.35c. to 2.45c.
Strips, Cleveland	2.35c. to 2.45c.
Strips, deliv'd Chicago	2.63c.
Strips, Worcester	2.50c. to 2.60c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	3.60c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Merchant Trade

	Base per Keg
Standard wire nails	$1.95 to $2.00
Cement coated nails	1.95 to 2.00
Galvanized nails	3.95 to 4.05

	Base per Lb.
Polished staples	2.40c. to 2.50c.
Galvanized staples	2.65c. to 2.75c.
Barbed wire, galvanized	2.60c. to 2.70c.
Annealed fence wire	2.10c. to 2.20c.
Galvanized wire, No. 9	2.55c. to 2.65c.
Woven wire fence (per net ton to retailers)	$65.00

To Manufacturing Trade

Bright hard wire, Nos. 6 to 9 gage	2.30c.
Spring wire	3.30c.
(Carload lots, f.o.b. Chicago)	
Wire nails	$2.00 to $2.05
Annealed fence wire	2.40c. to 2.50c. (lb.)
Bright hard wire to manufacturing trade	2.35c.

Anderson, Ind., mill prices are ordinarily $1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

Light Plates

	Base per Lb.
No. 10, blue annealed, f.o.b. F'gh	1.90c. to 2.00c.
No. 10, blue annealed, f.o.b. Chicago dist.	2.10c.
No. 10, blue annealed, del'd Phila.	2.32c. to 2.42c.
No. 10, blue annealed, B'ham	2.15c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh	2.05c. to 2.15c.
No. 13, f.o.b. Chicago dist.	2.25c.
No. 13, del'd Philadelphia	2.34c. to 2.44c.
No. 13, blue annealed, B'ham	2.30c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh	2.35c. to 2.45c.
No. 24, f.o.b. Chicago dist. mill	2.45c. to 2.55c.
No. 24, del'd Philadelphia	2.64c. to 2.74c.
No. 24, f.o.b. Birmingham	2.60c.

Steel Furniture Sheets

No. 24, f.o.b. P'gh	3.60c.

Galvanized

No. 24, f.o.b. Pittsburgh	2.90c. to 3.00c.
No. 24, f.o.b. Chicago dist. mill	3.10c. to 3.20c.
No. 24, del'd Cleveland	3.18½c. to 3.28½c.
No. 24, del'd Philadelphia	3.24c. to 3.29c.
No. 24, f.o.b. Birmingham	3.15c.

Continuous Mill Sheets

No. 10 gage	1.70c. to 1.80c.
No. 13 gage	1.85c. to 1.95c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.65c. to 2.70c.
No. 28, f.o.b. Chicago dist. mill	2.75c. to 2.80c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	3.40c.

Long Ternes

No. 24, 8-lb. coating, f.o.b. mill	3.45c. to 3.55c.

Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh	3.70c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills	$5.00
Standard cokes, f.o.b. Gary	5.10

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.30
15-lb. coating I.C.	12.90
20-lb. coating I.C.	14.00
25-lb. coating I.C.	$15.20
30-lb. coating I.C.	16.00
40-lb. coating I.C.	17.80

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.65c. per Lb.

S.A.E. Series Numbers		Alloy Differential
2000	(½% Nickel)	$0.25
2100	(1½% Nickel)	0.55
2300	(3½% Nickel)	1.50
2500	(5% Nickel)	2.25
3100	Nickel Chromium	0.55
3200	Nickel Chromium	1.35
3300	Nickel Chromium	3.80
3400	Nickel Chromium	3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100	Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100	Chromium Spring Steel	0.20
6100	Chromium Vanadium Bar	1.20
6100	Chromium Vanadium Spring Steel	0.95
9250	Silicon Manganese Spring Steel (flats)	0.25
	Rounds and squares	0.50
Chromium Nickel Vanadium		1.50
Carbon Vanadium		0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	34.00
Light (from rail steel), f.o.b. mill	32.00
Light (from billets), f.o.b. Ch'go mill	36.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅝ in. and larger	$2.80
Spikes, ½ in. and smaller	2.80
Spikes, boat and barge	$3.00
Tie plate, steel	2.07½
Angle bars	2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	73 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	*Iron* Inches	Black	Galv.
⅛	47	21½	¼ and ⅜	+11	+36
¼ to ⅜	53	27½	½	23	5
½	58	44½	¾	28	11
¾	62	50½	1 and 1¼	31	15
1 to 3	64	52½	1½ and 2	35	18

Lap Weld

2	57	45½	2	23	9
2½ to 6	61	49½	2½ to 3½	28	13
7 and 8	58	45½	4 to 6	30	17
9 and 10	56	43½	7 and 8	29	16
11 and 12	55	42½	9 to 12	26	11

Butt Weld, extra strong, plain ends

⅛	43	26½	¼ and ⅜	+13	+48
¼ to ⅜	49	32½	½	23	7
½	55	44½	¾	28	12
¾	60	49⅛	1 to 2	34	18
1 to 1½	62	51½			
2 to 3	63	52½			

Lap weld, extra strong, plain ends

2	55	44½	2	29	13
2½ to 4	59	48½	2½ to 4	34	20
4½ to 6	58	47½	4½ to 6	33	19
7 to 8	54	41½	7 and 8	31	17
9 and 10	47	34½	9 to 12	21	8
11 and 12	46	33½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discount of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		*Charcoal Iron*	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—3¾ in.	54	2½ in.—2¾ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discount a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 0.40% base	50

Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

Fabricated Structural Steel

Projects of 104,000 Tons Include Large Chicago Building and Subway—Awards Smaller than Week Ago

NEW fabricated structural steel inquiries totaling 104,000 tons are the largest for any week since last June and include two Chicago projects, the Field Estate Building, 24,000 tons, and a section of subway, 35,000 tons. In an effort to reduce unemployment, large projects are being expedited. The Public Service Co. of Northern Illinois has set forward its $1,000,000 program of improvements for 1931. Another large project swelling this week's total is 15,000 tons of tanks for the Prairie Pipe Line Co.

Fabricated structural steel awards total 32,000 tons, which is smaller than those of a week ago. Included are 6655 tons in a New York apartment building, 6600 tons in an Ohio River bridge at Pittsburgh, and 5000 tons in the Hetch Hetchy pipe line, California. Awards follow:

North Atlantic States

NEW YORK, 6655 tons, apartment building, Seventy-seventh Street and First Avenue, to Lehigh Structural Steel Co.

NEW YORK, 440 tons, apartment building, West Eighty-fifth Street, to Paterson Bridge Co.

NEW YORK, 200 tons, school No. 123, to B. Schacht & Sons, Inc., New York.

NEWARK, N. J., 500 tons, electrification work for Pennsylvania Railroad, to Fort Pitt Bridge Works Co.

COLD SPRING, N. Y., 200 tons, residence, to American Bridge Co.

PICATINNY, N. J., 120 tons, United States Arsenal, to Ingalls Iron Works.

BLOOMFIELD, N. J., 100 tons, viaduct for Erie Railroad, to American Bridge Co.

PITTSBURGH, 6600 tons, West End-North Side bridge over Ohio River, to American Bridge Co.

PITTSBURGH, 2590 tons, Market Street highway bridge, to McClintic-Marshall Co.

PITTSBURGH, 867 tons, Federal Reserve Bank, to McClintic-Marshall Co.

DARBY CREEK, PA., 345 tons, bridge, to McClintic-Marshall Co.

LAWRENCE COUNTY, PA., 200 tons, highway bridge, to Pittsburgh-Des Moines Structural Steel Co.

VANPORT, PA., 600 tons, plates for two 80,000-gal. tanks for Sun Oil Co., to Warren City Tank & Boiler Co.

ERIE, PA., 250 tons, New York Central bridge, to McClintic-Marshall Co.

ERIE RAILROAD, 290 tons, trestle, to American Bridge Co.

CHESTER, PA., 350 tons, bridge for State of Pennsylvania, to McClintic-Marshall Co.

PENNSYLVANIA RAILROAD, 200 tons, electrification towers in West Philadelphia yards, to Belmont Iron Works.

PHILADELPHIA, 1350 tons, Medical Towers building, reported to American Bridge Co.

PHILADELPHIA, 400 tons, Mascher Street bridge for city, to Phoenix Bridge Co.

ERIE RAILROAD, 450 tons, two bridges of 225 tons each at Hawthorne and Hackensack, N. J., to Phoenix Bridge Co.

The South

MOBILE, ALA., 350 tons, two bridges for Alabama, Tennessee & Northern Railroad, to Virginia Bridge & Iron Co.

FORT WORTH, TEX., 150 tons, highway bridge, to Virginia Bridge & Iron Co.

MONTGOMERY COUNTY, TENN., 100 tons, highway bridge, to Virginia Bridge & Iron Co.

KNOXVILLE, TENN., 465 tons, Henley Street bridge, to McClintic-Marshall Co.

SAN MATEO, FLA., 150 tons, highway bridge, to Nashville Bridge Co.

MISSOURI PACIFIC RAILROAD, 500 tons, bridge in Arkansas, to Virginia Bridge & Iron Co.

Central States

CHICAGO, 320 tons, Smyser elementary school, to Midland Structural Steel Co.

CHICAGO, 750 tons, Randolph Street viaduct and station for Illinois Central, to American Bridge Co.

SOUTH CHICAGO, 400 tons, Pullman Co., to McClintic-Marshall Co.

EVANSTON, ILL., 400 tons for Milwaukee road, to an unnamed bidder.

WABASH RAILWAY, 200 tons, bridge at Ferguson, Mo., to McClintic-Marshall Co.

Western States

VENTURA, CAL., 160 tons, jail, to McClintic-Marshall Co.

SOUTH GATE, CAL., 200 tons, factory for Rheem Mfg. Co., to McClintic-Marshall Co.

SAN FRANCISCO, 5000 tons, plates, Hetch Hetchy pipe line, to Western Pipe & Steel Co.

SPOKANE, WASH., 200 tons, Fox Theater, to Wallace Bridge & Structural Steel Co.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

North Atlantic States

BOSTON, 246 tons, Jamaica Plain district school.

FRAMINGHAM, MASS., 180 tons, stables.

STAMFORD, CONN., 300 tons, weave shed for Barrymore Seamless Wiltons, Inc.

NEW YORK, 600 tons, Medical Chambers Building, East Fifty-fourth Street.

NEW YORK, 1000 tons, highway bridge at Coney Island.

NEW YORK, 15,000 tons, West Side elevated highway.

BOWMANSVILLE, N. Y., 400 tons, New York Central Railroad bridge.

PHILADELPHIA, 100 tons, surgical pavilion for University of Pennsylvania.

PHILADELPHIA, 780 tons, tubercular building for Philadelphia General Hospital, new bids being taken.

The South

BAYTOWN, TEX., 500 tons, Humble Oil Co.

Central States

DETROIT, 800 tons, warehouse for Firestone Tire & Rubber Co.

DETROIT, 600 tons, Michigan Bell Telephone Co. exchange building.

STATE OF MICHIGAN, 450 tons, highway bridges.

SELFRIDGE FIELD, MICH., 1000 tons, sea wall for United States Army.

FOSTORIA, OHIO, tonnage not stated, two theaters.

FREMONT, OHIO, tonnage being estimated, theater.

MANSFIELD, OHIO, tonnage not stated, theater.

TOLEDO, OHIO, 2000 tons, New York Central Railroad station.

CLEVELAND, 350 tons, South High School.

CLEVELAND, 600 tons, factory for General Electric Co.

EVANSVILLE, IND., 7700 tons, Ohio River bridge; American Bridge Co., low bidder on 5300 tons for superstructure, and Globe Construction Co., Evansville, low bidder for approaches.

STATE OF ILLINOIS, tonnage not estimated, $1,000,000 program set forward to 1930 from 1931 plans of Public Service Co. of Northern Illinois.

CHICAGO, 24,000 tons, Field Estate building.

CHICAGO, 35,000 tons, first section of subway.

CHICAGO, 2300 tons, school, Hansell-Elcock Co., low bidder.

GREAT NORTHERN RAILROAD, 1600 tons, 1931 bridge requirements.

Western States

INDEPENDENCE, KAN., 15,000 tons, tanks for Prairie Pipe Line Co.

PASADENA, CAL., 400 tons, light plant for city; bids Nov. 14.

OAKLAND, CAL., 390 tons, 24-in. welded pipe, East Bay Municipal Utility District; bids Nov. 3.

SAN FRANCISCO, 4000 tons, Pacific Fruit Express Co.; bids being taken.

New York Iron and Steel Market

(*Concluded from page* 1332)

to Bridgeport, Conn., are offering $9, on barge, New York. The tendency of prices continues downward, and certain grades have declined further. Heavy breakable cast is quoted by brokers at $7.25, New York, for eastern Pennsylvania shipment and at $7.50 for delivery to a Florence, N. J., foundry user. Stove plate is at $9 a ton, Phoenixville, Pa., or $5.50, New York, and machine shop turnings are at $4.50 a ton, New York.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	$8.50 to	$9.00
Heavy melting steel (yard)	5.50 to	5.75
No. 1 hvy. breakable cast	7.25 to	7.50
Stove plate (steel works)		5.50
Locomotive grate bars		5.50
Machine shop turnings		4.50
Short shoveling turnings		4.50
Cast borings (blast fur. or steel works)	4.00 to	4.50
Mixed borings and turnings		4.00
Steel car axles		17.00
Iron car axles		19.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)		7.25
Forge fire	7.00 to	7.50
No. 1 railroad wrought	8.75 to	9.25
No. 1 yard wrought, long	7.75 to	8.25
Rails for rolling	9.25 to	9.75
Stove plate (foundry)	6.00 to	6.50
Malleable cast (railroad)	10.00 to	10.50
Cast borings (chemical)	8.50 to	9.00

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	$13.50
No. 1 hvy. cast (columns, bldg. materials, etc.); cupola size	11.50
No. 2 cast (radiators, cast boilers, etc.)	11.00

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Copper Active and Strong—Tin Dull—Lead Firm—Zinc Higher

NEW YORK, Nov. 3.

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Nov. 3	Nov. 1	Oct. 31	Oct. 30	Oct. 29
Lake copper, New York	9.62½	9.62½	9.62½	9.62½	9.62½
Electrolytic copper, N. Y.*	9.25	9.25	9.25	9.25	9.25
Straits tin, spot, N. Y.	25.75	....	26.75	26.85	26.90
Zinc, East St. Louis	4.25	4.20	4.10	4.00	3.95
Zinc, New York	4.60	4.55	4.45	4.35	4.30
Lead, East St. Louis	4.95	4.95	4.95	4.95	4.95
Lead, New York	5.10	5.10	5.10	5.10	5.10

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Copper

The better tone, noted a week ago, has developed into a much stronger one. For the first time in many weeks there is talk of an advance in prices instead of another decline. Heavy sales abroad have had a large share in this change. It is estimated that the foreign sales for October will approximate 67,500 gross tons. With the exception of the 108,000 tons in May, 1930, these are the largest sales since February, 1929, when the total was about 70,000 tons. Domestic sales could be very much larger were producers willing to part with more metal at low levels. It is reported that two or three sellers are out of the market. Naturally, prices are very firm, with electrolytic copper quoted at 9.50c., delivered Connecticut Valley. The price of Copper Exporters, Inc., is stiff, at 9.80c., c.i.f. usual European ports. Lake copper is also in a strong position, at 9.50c. to 9.62½c., delivered.

Conferences in the last week have been going on between the Katanga interests in Africa, represented by two prominent Belgian operators, and the American and Canadian producers. The Katanga people are willing to curtail production provided the Canadian interests will cooperate with the American and make the matter one of world-wide effect. No announcement has been made of the result of these conferences, but the project has added to the firm tone of the market.

Copper Averages

The average price of Lake copper for October, based on daily quotations in THE IRON AGE, is 9.97c., delivered New York. The average price of electrolytic copper is 9.60c., refinery, or 9.85c., delivered in the Connecticut Valley.

Tin

Very little buying is reported, and the market is exceedingly dull. This is true despite the fact that prices are down somewhat from those prevailing a week ago, due to the October statistics. Spot Straits tin today was quoted at 25.75c., New York, and prices in London were about £5 a ton less than a week ago, with spot standard quoted at £113 17s. 6d., future standard at £115 5s. and spot Straits at £118 12s. 6d. The Singapore price today was £122 15s.

Deliveries into consumption during October were reported as 7580 tons, but this is about 760 tons less than the actual or unofficial deliveries. Stocks in warehouses in Great Britain on Saturday, Nov. 1, were 23,750, a decrease of 424 tons for the week. It develops that the carry-over of metal in the Straits has increased and it is estimated that the tin available for shipment in November will approximate 13,600 tons.

Lead

Prices are exceedingly firm and the market is moderately active. Fairly large sales are noted, including December shipments, with the sales for that delivery approximating about 50 per cent of estimated needs. There is also a good demand for carload and small lots for early delivery. Prices are unchanged at 4.95c., St. Louis, with the quotation of the leading interest at 5.10c., New York.

Antimony

Quotations for Chinese metal are somewhat lower in a dull market, at 7.12½c., duty paid, New York, for all positions.

Zinc

A decided change for the better is noted in this market. Prices for prime Western zinc have advanced sharply during the week and stand today at 4.25c., East St. Louis, or 4.60c., New York. Various causes for this are noted. One is a desire of consumers to purchase as soon as possible on a rising market, coupled with the inclination of producers to hold back. There is also talk of effective curtailment in output. There has been a decided increase in demand from consumers.

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	16.50c.
Copper, hot rolled, base sizes	19.50c.
Copper, cold rolled, 14 oz. and heavier, base sizes	21.50c.
Seamless Tubes—	
Brass	21.50c.
Copper	21.75c.
Brass Rods	14.87½c.
Brazed Brass Tubes	24.12½c.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	9.75c. to 10.25c.
Zinc sheets, open	10.75c. to 11.25c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	29.00c. to 30.00c.
Tin, bar	31.00c. to 32.00c.
Copper, Lake	11.00c.
Copper, electrolytic	10.75c.
Copper, casting	10.50c.
Zinc, slab	5.75c. to 6.75c.
Lead, American pig	6.00c. to 7.00c.
Lead, bar	8.00c. to 9.00c.
Antimony, Asiatic	10.00c. to 10.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	24.00c. to 25.00c.
Alum. ingots, No. 12 alloys	23.00c. to 24.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ½	20.50c. to 21.50c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	32.25c.
Tin, bar	34.25c.
Copper, Lake	10.63c.
Copper, electrolytic	10.63c.
Copper, casting	10.38c.
Zinc, slab	5.50c. to 5.75c.
Lead, American pig	5.75c. to 6.00c.
Lead, bar	8.50c.
Antimony, Asiatic	11.50c.
Babbitt metal, medium grade	15.25c.
Babbitt metal, high grade	36.00c.
Solder, ½ and ½	19.75c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses. (Prices quoted are nominal. Holders of metal are generally unwilling to part with stock at present low levels.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	7.75c.	8.50c.
Copper, hvy. and wire	7.25c.	8.25c.
Copper, light and bottoms	6.75c.	7.50c.
Brass, heavy	4.50c.	5.50c.
Brass, light	3.50c.	4.50c.
Hvy. machine composition	7.00c.	7.75c.
No. 1 yel. brass turnings	5.00c.	5.50c.
No. 1 red brass or compos. turnings	6.25c.	7.25c.
Lead, heavy	3.75c.	4.25c.
Lead, tea	2.50c.	3.00c.
Zinc	2.25c.	2.75c.
Sheet aluminum	7.50c.	9.50c.
Cast aluminum	7.00c.	8.75c.

30,000,000 Tons of Scrap Used

Rolled Steel Makers Consumed 22,600,900 Tons in 1929, Survey Reveals

THE American iron and steel industry used nearly 30,000,000 gross tons of iron and steel scrap in 1929, according to a survey of scrap consumption made by the Institute of Scrap Iron and Steel, Inc., 11 West Forty-second Street, New York. Of this total, approximately 25,000,000 tons was used by the manufacturers of steel ingots and castings and approximately 5,000,000 tons by the iron foundries, blast furnaces and other miscellaneous consumers of scrap. Steel companies making rolled steel products consumed 22,600,900 tons, while makers of steel castings are calculated to have consumed about 1,772,410 tons. A summary of the survey report says:

"The first section of the report covers all primary steel producers, exclusive of steel castings makers, whose total ingot producing capacity, as of Dec. 31, 1929, was 62,265,670 gross tons annually, as estimated by the American Iron and Steel Institute. The steel mills covered by this report produced 54,850,433 tons of steel ingots in 1929 and used in this production approximately 22,600,900 tons of scrap. These figures were based on detailed reports and estimates received from steel companies which had approximately 78 per cent of the total steel ingot capacity of the country. Estimates were made for only a few companies.

"The actual consumption of scrap by the companies which figure in this report—about 78 per cent of the total steel-making capacity—is found to be 17,628,722 gross tons. On this basis, the total scrap consumption for all companies would be 22,600,900 tons. Allowance should be made, however, for the fact that the computed consumption for the 22 per cent, for which no figures are available, is made on the basis of the consumption by the reporting companies, whereas the percentage of scrap used by the 22 per cent group was undoubtedly higher because few of the latter possess Bessemer steel-making capacity, this process consuming little scrap.

Purchased Scrap 8,364,800 Tons

"Computed totals for all of the steel companies, on the basis of the figures at hand, are as follows:

	Gross Tons
Total consumed by steel companies	22,600,900
Total home scrap for all companies	14,236,100
Total purchased scrap	8,364,800

"It is the opinion of the Institute of Scrap Iron and Steel that these figures are conservative in all three cases, and probably should be adjusted upward on the basis of the statistical probabilities involved in the situation, which are these:

"Several of the small steel companies whose scrap figures are not available for this survey are 100 per cent users of scrap—that is, they use no pig iron whatever. Moreover, most of the non-reporting steel companies are known to be substantial purchasers of scrap, in many instances their total scrap consumption running as high as 55 per cent of their annual ingot output. And, further, as before stated, the minor portion of the total Bessemer steel-making capacity is represented among the group for which no figures are available.

"Therefore, the purely mathematical calculation, by which the 22 per cent group is figured on the same basis as the 78 per cent, may fall short of the mark by a considerable margin. It has been found from the returns of some of the steel companies which have no Bessemer capacity that their total consumption of scrap last year was approximately 55 per cent of their total ingot output and their purchased scrap amounted to 61.6 per cent of the scrap consumed. Fifteen companies, some small and some fairly large, but not including any which use an all-scrap steel-making process, whose total ingot capacity was 9,806,725 tons*, used last year 4,688,017 tons of scrap. Of this amount, 2,890,977 tons was purchased in the open market. These companies make no Bessemer steel, though some of them have electric furnaces, which consume scrap almost exclusively.

Increasing Importance of Scrap

"These figures illustrate the increasing importance of scrap in the manufacture of steel. The future trend will undoubtedly be toward an almost exclusive use of the open-hearth and electric methods of making steel. The trend is steadily in favor of the processes which require large scrap tonnages.

Purchases from Dealers

"The survey conducted by the Institute of Scrap Iron and Steel, Inc., reveals that most of the steel companies of the country are confining their purchases of scrap to the brokers and dealers. In many of the reports it is shown that no purchases were made direct from scrap producers. Another interesting fact is that a good many steel companies are finding it possible to utilize the secondary grade of steel scrap, commonly referred to in the trade as No. 2 heavy melting steel. It is obvious also that the use of specially-prepared scrap, such as compressed sheet steel, is growing. A further report on these and other interesting conclusions to be obtained from the scrap survey will be issued shortly by the Institute of Scrap Iron and Steel, Inc., as well as a detailed report on scrap consumption by steel casting companies."

*As the steel industry operated last year at an average of 87 per cent the total output for this group is estimated at 8,531,850 tons.

Reinforcing Steel

Awards of 7600 Tons—Inquiries Light

LETTINGS of reinforcing steel the past week totaled 7600 tons, of which 4000 tons will be used in a viaduct at Cincinnati for the Union Terminals project. Awards in October called for 32,350 tons, compared with 14,225 tons in September. New projects were among the lightest of the year, amounting to only 585 tons. Awards follow:

NEW YORK, 900 tons, foundations for Lehigh Valley Railroad warehouse, Twenty-sixth Street and Eleventh Avenue, to Carroll-McCreary Co.

NEW YORK, 540 tons, United States Assay Office, South Street, to Carroll-McCreary Co.

NEW YORK, 156 tons, warehouse for Santine Storage Moving Co., 610 Morris Park Avenue, Bronx, to National Bridge Works.

FORT WADSWORTH, STATEN ISLAND, N. Y., 250 tons, barracks, to Igoe Brothers.

JAMAICA, N. Y., 175 tons, addition to warehouse of Queensboro Storage Warehouse, Inc.; placed by Turner Construction Co. with Jones & Laughlin Steel Corpn.

YOUNGSTOWN, OHIO, 1100 tons, filtration plant, to Truscon Steel Co.

CINCINNATI, 4000 tons, viaduct for Union Terminals project, to Pollak Steel Co.

CLEVELAND, 460 tons, municipal stadium, to Republic Steel Corpn.

VENTURA, CAL., 100 tons, jail building, to an unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

NEW YORK, 900 tons, foundations for penitentiary, Riker's Island, Department of Correction; general contract awarded to C. A. Williams Co., Inc.

PLEASANTVILLE, N. Y., 105 tons, undercrossing, Saw Mill River Parkway, Westchester County Park Commission; general contract let to Petro Luciano & Son, Inc., White Plains, N. Y.

WASHINGTON, 975 tons, House of Representatives office building; Consolidated Engineering Co., Baltimore, low bidder on general contract.

WASHINGTON, unstated tonnage, Theodore Roosevelt High School; general contract bids to be opened Nov. 12 at Room 427, Municipal Building.

YONKERS, N. Y., 135 tons, grade separation and bridge work; general contract let to Aborio Construction Co., Poughkeepsie, N. Y.

MCKEESPORT, PA., 150 tons, Boston bridge over Youghiogheny River; Vang Construction Co., general contractor.

PITTSBURGH, unstated tonnage, substructure for West Tenth Street bridge; Vang Construction Co., general contractor.

CLEVELAND, 330 tons, Big Four Railroad bridge at West Forty-fifth Street.

VANCOUVER, B. C., 2000 tons, Burrard Street bridge; bids opened.

BURLEY, IDAHO, 402 tons, paving for Bureau of Reclamation; bids opened.

No Marked Change in Motor Car Output Expected Before January

DETROIT, Nov. 3.

DESPITE the fact that automobile production in October fell to perhaps the lowest level of the year, there are some signs of expansion in the industry.

Chevrolet is getting its activities into high gear, with the result that November output should be large. Its program is responsible for the employment of thousands of men not only in the company's own factories, but also in Fisher Body plants in which Chevrolet bodies are built. Buick's total assemblies the past month are reported to exceed 10,000. This represents an upward revision of earlier figures.

Hudson-Essex is said to be about ready to start work on its 1931 models, with some 5000 units scheduled for November. Dodge is understood to be considering a new line of cars to offer to the public at show time in January, while Pontiac, Oakland and Oldsmobile are preparing new designs. Hupp also is counting on fresh models to bring it back into the foreground, although factory operations at the moment are negligible. Reo is adhering to a program of about 125 cars a day five days a week to fill orders for its Flying Clouds and Royale eights. Packard is maintaining output at 100 units a day on a five-day week, while Cadillac is turning out some 150 a day, five days a week. Approximately one-third of the output is LaSalles and the remainder V-eights and V-twelves. Only a few V-sixteens are on the current schedule. Although it is early to judge its final reception, response of the buying public to the new Nash sixes and eights has resulted in production holding at 450 cars a day on a five-and-a-half-day week. Graham-Paige's operations are attuned to a program of 90 cars a day, five days a week.

October Shows Production Decline

THE Marmon-Roosevelt people are to present shortly a 16-cylinder car reported to be different in design and appearance from anything now on the market. This car may sell for less than $5,000. Studebaker is averaging about 300 cars a day. Chrysler, Plymouth and De Soto have shown little, if any, improvement, although some reports declare that the Chrysler organization has plans for expansion of output in the near future.

So far as October's production for the industry in the United States and Canada is concerned, it probably hovered around the 200,000 mark, although some observers believe that it fell considerably short of that figure. As Chevrolet failed to get started on its new models until the month almost ended, the reduction in Ford output probably will be a measure of the difference between the September and October statistics. The sampling of dealers with new models will be a big factor in sustaining November on a plane closely paralleling that of the past month.

October automobile production in United States and Canada probably was 200,000 cars or less.

* * *

Ford's October output expected to show decline from September; further recession likely in November.

* * *

Steel mills cannot count on much tonnage from automobile industry until January or possibly February.

* * *

Chevrolet has heavy November schedule.

The Ford Motor Co. is still operating three days a week at the Rouge plant, but evidence is accumulating that activities are likely to slump this month. Ford's steel purchases for November were very meager, and its steel plant is reported to be running on a somewhat curtailed basis. Meanwhile, the company is understood to be making a concerted sales drive in an effort to stimulate retail business. This is indicated in a letter which Edsel Ford has sent to all dealers, in which he emphasizes that "the road to general business recovery lies in increased sales, and we look to the Ford dealer to do his share by putting his shoulder to the wheel and working as he has never worked before."

Mr. Ford pointed out that the company is in the midst of its largest expansion program, spending millions this year and next for new plants throughout the world. He promised dealers that no major changes will be made in the model A car, although its quality will constantly be improved. This bears out previous predictions. Incidentally, it is regarded as unlikely that Ford will bring out an eight-cylinder car any time soon. There have been many reports to this effect, but they are generally discredited. No one doubts that Ford has an eight-cylinder job which it could bring out whenever desired, but the time for this is not propitious. There has been much talk about a reduction in prices of model A. Most observers believe that such action depends principally on what kind of a car Chevrolet will put out and at what price it will be marketed.

Pig Iron Shipments Gain

IN pig iron there are some encouraging developments. A large producer estimates that October shipments were 15 per cent greater than September's and orders for November give promise of a further gain. The Chevrolet, Buick, Packard, Cadillac and Saginaw Malleable foundries have good production schedules for the immediate future. The Saginaw Malleable foundry, a subsidiary of General Motors, is especially busy because most, if not all, of the malleable work for General Motors units has been concentrated there. The Oakland-Pontiac foundry at Pontiac, Mich., which has made few castings since mid-summer, is to resume operations early this month, according to current reports. The Studebaker foundry at South Bend, Ind., is said to be preparing to go down for a month shortly.

Little Tonnage Expected Until 1931

THERE is not much in the present situation, however, to buoy up the finished steel market. Perhaps the most favorable factor is the pronounced tendency on the part of steel buyers to refrain from bearing down too severely on prices. On the other hand, district steel offices and local manufacturers feel that little business will appear the remainder of the year. The seasonal trend is downward. It is the consensus of opinion that the steel mills cannot count on much tonnage from the automobile industry until after Jan. 1, and possibly not until February, when spring production gets under way.

The Great Lakes Steel Corpn. continues to operate two open-hearth furnaces and its hot strip mill. Originally scheduled for completion the first of the year, its 14-in. merchant bar mill will not be ready until February or March. It is now about to

take bids on the construction of its proposed 10-in. bar mill. Beyond the erection of this latter unit, the company has not decided on a further building program.

Automobile Industry Makes Poor Financial Showing

THE prolonged mid-summer shutdowns, followed by curtailed output in the weeks which have followed, have had a devastating effect on third quarter financial showings of motor car makers.

General Motors Corpn. failed to earn its dividend requirements, having a net of 53c. a share, compared with $1.58 in the same period of 1929. Hudson lost more than $2,000,000 during the quarter, as contrasted with a profit last year. Reo's loss amounted to slightly less than $1,000,000, as against a profit of 20c. a share a year ago. The Franklin company has omitted its quarterly dividend on its preferred stock, while Auburn earned only 97c. a share on the common, compared with $6.72 in the like quarter of 1929. Packard's directors declared a dividend of 25c. a share for the third quarter, the same as in the two preceding quarters, but will pay only 15c. in the fourth quarter.

Railroads Protest New Rates

Charge Undue Preference for Long Hauls— Cite Loss of Revenue

RAILROAD corporations and receivers whose roads serve Western Trunk Line territory, as defined in No. 17,000, part 2, Western Trunk Line Class Rates, Ex Parte 87, covering class rates within Western Trunk Line territory, have filed a petition with the Interstate Commerce Commission in Washington for reopening of this rate structure which went into effect last May on iron and steel and other commodities.

This petition states that undue preference has been created for long-haul traffic and that losses have resulted to the railroads on iron and steel articles.

Many Objections Cited

Other reasons given by the petitioning railroads for reopening of the rate structure are as follows:

The actual increase in petitioners' revenues resulting from prescribed adjustment will fall short of the amount intended by the commission, and even the intended increase is demonstrated by the report itself to be inadequate.

Reductions prescribed are not only incompatible with the revenue purpose of the proceedings, but they result from a theory which is contrary to the evidence.

The prescribed readjustment creates undue preferences for long-haul traffic.

Severe losses in carrier revenue from rates on iron and steel articles and disturbance in rate relationship of competing producing centers are not justified by any contention or evidence in the proceedings.

Prescribed rates are so low as to distort relationships around the entire southern and western border of the readjusted territory, thus defeating adjustments of the commission's own creation.

Rates prescribed are inconsistent with a purpose to develop the country as a whole.

Rates prescribed are faulty and inadequate to the extent that they fall below the levels stated in the petition.

A fifth-class percentage relation to first on a level lower than 40 per cent is not justified.

The low level of prescribed fifth-class rates threatens heavy reductions in rates on packing house products, severe revenue losses and confusion in the entire rate adjustment on livestock and livestock products.

Undue Preferences Charged

Under the heading of "Iron and Steel Articles," this petition suggests that, if an examination of the class rates discloses undue preference for long-haul shippers and serious losses in carrier revenue by reason of abnormal reductions, an examination of prescribed rates on iron and steel articles brings into still sharper relief an adjustment prolific of preferences and revenue losses.

It points out that iron and steel articles are produced in great volume at only a limited number of places. Their location being controlled largely by natural resources, the markets for the products are keenly contested, and the consumption of tonnage very heavy. Marked variation in rates play a controlling part in determining the ability of a producer to engage in a reasonable competition for business. So far as this case is concerned, the outstanding producing areas are the Pittsburgh-Youngstown-Cleveland districts, the Chicago district, Duluth (Steelton), the East St. Louis district and Minnequa, Colo., with important concerns also located in Milwaukee and Kansas City.

In its report the commission prescribes for iron and steel articles, in carloads, a maximum of 32½ per cent of first class, where the commodities now move under class rates reflecting a higher percentage. This basis, if substituted for existing commodity rates, would produce some advances between Chicago and zone 1 of Western Trunk Line territory, the greatest advance being 14½c. for 100 lb. to Duluth—which means nothing because of Duluth's own position as a producer of iron and steel and because Eastern producing territory has access to Duluth via water on a low basis of rates. To territory beyond, the rates from Chicago on these articles are reduced sufficiently to cause impressive losses per car on heavy loading traffic. Chicago and other Western producing points are placed at a pronounced disadvantage in favor of Pittsburgh district competitors.

Western Steel Mills at Disadvantage

The petition then gives a table for a few points of destination. With each station in Western Trunk Line territory a potential receiver of iron and steel articles, it is claimed that the reductions from Pittsburgh cause revenue losses to carriers and disadvantages for Western steel competitors. The contemporaneous reductions from Chicago to Grand Island, Neb., at 12c. a 100 lb., and from Pittsburgh at 23c. a 100 lb., means $2.40 a ton from Chicago and $4.60 from Pittsburgh; from Chicago to Topeka, Kan., the reduction amounts to $1.20 a ton and from Pittsburgh $3.40 a ton. Chicago gets a reduction to Denver of $2.10 a ton versus Pittsburgh's reduction of $5.50. Apart from the marketing disparities which these figures indicate, the reductions per carload in some instances exceed $100.

The petition then goes on to point out that wholly apart from even greater deficiencies occurring through a period of years, which are fully and in detail presented to the commission as ground for relief, these figures of conditions present in the most recent years, and which are thus elaborately exhibited in the commission's report, demonstrate the failure of the intended relief to respond to the valid claims of the carriers. For 1929, on property investment, group 1 carriers of Western Trunk Line territory show a deficiency below a fair return of $48,093,093; group 2, a deficiency of $28,635,976; group 3, a deficiency of $16,826,225. The deficiency for the three groups representing Western Trunk Line territory as a whole amounted to $93,593,294. For the first seven months of 1930 the group 1 carriers have suffered a deficiency of $30,694,782; group 2, $27,144,624; group 3, $22,709,473, or a deficiency for Western Trunk Line territory as a whole of $80,546,879.

Morris Wheeler & Co., distributers of iron and steel products in Philadelphia, have moved to their new warehouse at Fox Street and Roberts Avenue.

Seek Higher Duty on Pig Iron

Eastern Interests Ask 50 Per Cent Increase Under Flexible Tariff Provision

WASHINGTON, Nov. 3.—Request for a maximum increase of 50 per cent in the duty on "iron in pigs" from the existing rate of 1.12½ per gross ton to $1.68¾ was made before the newly organized Tariff Commission at a formal short hearing last Thursday morning. The petitioners who are seeking an added duty of 56¼c. a ton are operators of merchant furnaces along the Atlantic Seaboard. They made their plea through H. M. Waybright, vice-president and traffic manager of the Mystic Iron Works, Everett, Mass., appearing in the absence of John W. Logan, Alan Wood Steel Co., Conshohocken, Pa., head of the furnace interests' association, who was unable to be present owing to the death of a brother.

The only other witness was S. E. Walton of the Heppenstall Co., Pittsburgh, whose melt includes Swedish charcoal iron, making up about 30 per cent of the total iron consumption of the company. Mr. Walton said the foreign charcoal iron is used by reason of its quality and declared it was not competitive with and costs 30 per cent more than American charcoal iron. He asked that charcoal or other iron not competitive with the American iron be put in a separate classification at a lower rate of duty. Chairman H. P. Fletcher inquired as to the practicability of the suggestion. Other members indicated that the commission would have no authority to classify the different grades of iron, even if it were practicable. Mr. Walton pointed out that imports could be classified on an analysis basis just as domestic iron is purchased on that basis. It was contended by Mr. Walton that since the Swedish charcoal iron costs about $40 a ton, Pittsburgh, the foreign material already calls for a premium.

First Plea Under New Metal Schedule

The effort of merchant furnace interests to get a higher rate on pig iron was the first plea made under the Hawley-Smoot flexible provision by producers of any of the products in the new metal schedule, which continued the rate of $1.12½ arising from Presidential proclamation in 1927, increasing the duty by 50 per cent from 75c. a ton. This was done upon pleas of merchant interests, and the contentions made then were similar to those presented last Thursday, except that information submitted had been brought up to date. As is the case now, complaint was made especially of competition from British India.

It was pointed out in the statement prepared by Mr. Logan and read by Mr. Waybright that the present reduced rate of importations was believed to be due solely to the industrial depression existing in this country. It was predicted that a revival of the industry here will be followed by largely increased importations. It was explained that while steel companies may occasionally sell some of their basic iron as "iron in pigs," it is not fair to assume that they are material factors in the manufacture and sale of merchant foundry and malleable iron, the grades principally making up importations.

Tonnage of imports, it was declared, is not a true measure of losses due to foreign competition. In many cases, Mr. Waybright told the commission, American manufacturers have been forced by foreign competition to cut their prices to cost or lower in order to keep their men and plants employed. Quoting from the "Summary of Tariff Information, 1929," as compiled by the Tariff Commission, it was stated that on account of the cost of the rail haul inland from ports of entry, imports are practically all consumed within about 200 miles of the seacoast. Imports, Mr. Waybright explained, compete with only about 1,200,000 tons of the total United States production (in 1929) of merchant pig iron of 9,013,852 tons. Of the total imports of 81,528 tons in the first eight months of 1930, it was stated that 61,252 tons, or 75.1 per cent, came from India.

Philadelphia Market Worst Sufferer

While the bulk of total importations have been to Atlantic ports from the Virginia capes northward, it was stated that the Philadelphia market has suffered more severely than any other section. Imports received at Philadelphia in the first eight months of the current year were said to have been 45,847 tons, or 56.2 per cent of the total. It was asked that equalization of freight rates be done at Philadelphia, primarily because most of the incoming shipments from abroad are consumed in that territory. Mr. Waybright said that only three merchant furnaces are in blast along the Atlantic seaboard. He read from a statement presented before the Senate Committee on Finance during tariff hearings by Col. Frank B. Richards, which showed that 32 merchant furnaces in different sections of the country, with investments of approximately $60,000,000, showed losses of $5,078,839 for 1926-1927-1928.

It was stated that comparison of the Alan Wood Steel Co.'s figures recently submitted to the commission with those submitted at the time of the prior investigation show that ore, labor and overheads are substantially the same as before. There has been a decrease, it was said, in the cost of fuel due to better blast furnace practice and increased capital expenditures in connection with coke works to reduce costs and improve the quality.

The furnace interests represented at the hearing were the Mystic Iron Works, Everett, Mass.; Witherbee, Sherman & Co., Port Henry, N. Y.; Chateaugay Ore & Iron Co., Lyon Mountain, N. Y.; E. & G. Brooke Iron Co., Birdsboro, Pa.; Colonial Iron Co., Riddlesburg, Pa.; Delaware River Steel Co., Chester, Pa.; Reading Iron Co., Reading, Pa.; Thomas Iron Co., Reading, and the Alan Wood Steel Co., Conshohocken.

Birdsboro Steel Foundry Undergoes Expansion

The Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., has completed additions to its buildings and equipment at a cost of more than $300,000. A cleaning room 65 x 140 ft., houses a new two-car type automatic annealing furnace, and will serve to facilitate car casting delivery. Late design molding machines and sand conveyors have been installed in the main foundry buildings. An improved 10-ton air furnace for the making of iron rolls has been constructed in the roll foundry. An additional 125-lb. air compressor is now operating for shop and foundry consumption. To its group of pattern storage buildings the company has added a new unit, 40 x 200 ft. A number of machine tools have also been installed in the machining and erecting bays to take care of early delivery on recently booked orders for rolling mill and special machinery.

Tonnage Rates Unchanged for November-December

Tonnage rates of sheet and tin mill workers in Midwestern mills continue without change for November-December at 18 per cent above base, following the bi-monthly examination of sales sheets. The average price of Nos. 26, 27 and 28 gage black sheets shipped during the 60 days ended Oct. 20 was disclosed as 2.75c. a lb., or unchanged from the average two months ago.

Tonnage rates for puddlers in Midwestern mills continue at $10.80 a ton for November-December, based on a 1.80c. card rate. A year ago the rate was $11.80 a ton, figured on a 2c. card, representing the average selling price of bar iron over the preceding 60-day period.

American Monorail Co., Cleveland, manufacturer of material-handling equipment, has opened a sales office at 7338 Woodward Avenue, in charge of S. J. Woodworth.

▲▲▲ PERSONALS ▲▲▲

WILLIAM W. HOLLOWAY, since 1923 president of the Wheeling Corrugating Co., Wheeling, W. Va., has been elected president of the Wheeling Steel Corpn., Wheeling, succeeding ISAAC M. SCOTT, whose resignation was announced in THE IRON AGE last week. Born at Wheeling in 1886, a son of the late James J. Holloway, who was a pioneer in the iron and steel industry in the Ohio Valley, Mr. Holloway has spent his entire business career with the Wheeling company and predecessors or subsidiaries, with the exception of two years in the Ordnance Department of the United States Army during the World War. He attended preparatory school at Linsly Institute in Wheeling and St. Paul's School, Concord, N. H., and received his formal technical education at the Sheffield Scientific School of Yale University, class of 1907. After leaving college Mr. Holloway entered the open-hearth department of La Belle Iron Works, Steubenville, Ohio, and was assistant superintendent of that department, when he left the company in 1912 to become assistant superintendent of the Martin's Ferry, Ohio, plant of the Wheeling Corrugating Co. In 1915, he became general manager of the corrugating company and the following year assistant to the president of the Whitaker-Glessner Co., Portsmouth, Ohio, where he served until the war period. In 1919, he returned to Wheeling as general manager of the corrugating company and in 1921 was made vice-president. In 1922, he was made president of the Whitaker-Glessner Co., which was then operated as a subsidiary of the Wheeling Steel Corpn., but the following year he returned to the corrugating company as president. Mr. Holloway has served as a director of the parent company for a number of years.

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WILLARD H. DOW, who has been assistant general manager of the Dow Chemical Co., Midland, Mich., has been appointed president and general manager to succeed the late Dr. Herbert H. Dow. Mr. Dow was graduated from the University of Michigan with a degree in chemical engineering in 1919.

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R. G. ADAIR, heretofore staff supervisor of safety and training of the American Rolling Mill Co., Middletown, Ohio, has been appointed assistant to HARRY HOLLIDAY, works manager of the company's Butler plant. Mr. Adair has been with the company for almost 15 years.

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W. M. CORSE, consulting metallurgical engineer, Washington, will speak on "Bearing Metals" at the regular monthly meeting of the Cincinnati chapter of the American Society for Steel Treating at the Engineers' Club, Cincinnati, Nov. 6.

W. W. Holloway

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L. D. ANDERSON, T. J. BURKE, W. T. CLARK, N. H. LAGERSTROM, O. J. MENKE and L. V. WORKMAN have been added to the staff of the Freyn Engineering Co., Chicago. They are scheduled to sail for Leningrad on Nov. 15.

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TAYLOR ALLDERDICE, formerly president of the National Tube Co., Pittsburgh, has been appointed secretary and manager of the Carnegie Hero Fund Commission, succeeding the late F. M. Wilmot.

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A. S. SEAMAN, vice-president Allegheny Steel & Brass Corpn., Chicago, has sold his interests in this concern and has opened his own office as sales representative at 80 East Jackson Boulevard, Chicago.

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OSCAR LORANGE is now representing the Ex-Cello-O Aircraft & Tool Corpn., Detroit, in the New England territory, being attached to the New York sales staff. WILLIAM H. SCHEER, formerly with the Clark Equipment Co., St. Louis, is now a member of the Cincinnati sales staff of the Ex-Cello-O company.

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G. C. KRUEGER, 6198 Wisconsin Avenue, Milwaukee, has been appointed sales representative for Wisconsin by the Neely Nut & Bolt Co., Pittsburgh. O. R. LANE, Paul Brown Building, St. Louis, has been appointed by this company as district sales representative in Missouri, Southern Illinois and Western Kentucky.

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A. H. D. ALTREE, vice-president in charge of manufacturing sales of the American Bosch Magneto Corpn., Springfield, Mass., for the past 12 years, has resigned effective Dec. 31. He has been associated with the company for 20 years and plans to retire from active business.

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C. F. MESSINGER, vice-president and general sales manager of the Chain Belt Co., Milwaukee, has been elected general manager, and H. S. GREENE has been elected to succeed to the sales managership. Other changes in executive personnel are: BRINTON WELSER, formerly secretary, is now a vice-president and a director; J. C. MERWIN was reelected vice-president; A. R. ABELT has been named secretary and will continue in charge of chain sales, and W. H. BRANDT, formerly assistant secretary, has been made assistant to the president.

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PAUL L. PRICE, who has been associated with the Irving Iron Works Co., New York, for the past 19 years in various capacities and most recently as treasurer and general manager, has been made vice-president in charge of research and development. He will continue as chief engineer of the company.

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WILLIAM J. KETCHAM, formerly assistant to H. W. McQuaid, chief metallurgist of the Timken-Detroit Axle Co., has been appointed chief metallurgist in charge of the laboratory at Oshkosh, Wis., of the Wisconsin Axle Co., a division of the Timken-Detroit company.

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CLYDE C. ELMES, heretofore superintendent of the Baldwin Locomotive Works, has been elected vice-president and general manager of the Dallett Co., Philadelphia, manufacturer of pneumatic tools, machinery and electric equipment.

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B. C. PALMER, who has been identified with the Ohmer Fare Register Co., Dayton, Ohio, since 1927, has been placed in charge of the Chicago office of the company and will direct activities in the surrounding territory of eight States.

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LEE F. ADAMS, commercial engineer of the General Electric Co., Schenectady, has been awarded the James H. McGraw Award for 1930 which is given in recognition of "outstanding and unselfish service to the manufacturing branch of the electrical industry."

JOHN A. WAHLGREN, who has been identified with the rubber business for the past 12 years, has been appointed general sales manager of the New York Belting & Packing Co., New York.

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J. S. MCKESSON, vice-president, Corrigan, McKinney Steel Co., Cleveland, announces the appointment of E. D. Pumphrey as district manager, with offices at 2343 Union Trust Building, Detroit.

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C. D. BROWN has been appointed industrial representative in the Philadelphia territory of the Westinghouse Traction Brake Co. He will handle the sale of Westinghouse-National air compressors in that district. O. W. SWARTZ has been appointed to a similar position in the Southwest territory, with headquarters at 3480 Asbury Avenue, Dallas, Tex.

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ALEXANDER CHURCHWARD, chief consulting engineer, Wilson Welder & Metals Co., Hoboken, N. J., gave an address before the Boston section of the American Welding Society on Oct. 24 at the Austin-Hastings Co., Inc., Cambridge, Mass., plant. Welding demonstrations were given following his address.

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CHARLES W. PENDOCK, president of Le Roi Co., Milwaukee, maker of gasoline engines, has been elected a director of the Independent Pneumatic Tool Co., Chicago.

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ALBERT KEUNEY, heretofore of the Chicago office of the Ex-Cell-O Aircraft & Tool Corpn., Detroit, has been transferred to the Milwaukee office to cover that territory. H. L. SCHUCK has become identified with the company and will work with the managers of the different offices of the company on tap problems.

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OTTO VON HALEM, director of the German Steel Syndicate's office at Düsseldorf for the extension of the use of steel, who has been spending a number of weeks in the United States, sailed for Germany Nov. 5.

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BENJAMIN SCHWARTZ, director general of the Institute of Scrap Iron & Steel, Inc., will broadcast the story of the scrap iron industry over a national hook-up of 34 stations of the Columbia Broadcasting System Saturday evening, Nov. 8, at 7:15 p. m., Eastern standard time. The broadcast is part of a series entitled "Romance in American Industry."

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A. J. JOHNSTON, executive vice-president of Hickman, Williams & Co., has been promoted to assistant to the president. Mr. Johnston will remain in charge of the Chicago office. He was graduated from the University of Wisconsin in 1913, and in that year he went to work for Hickman, Williams & Co. His rise through successive positions of importance has been steady.

▲▲▲ OBITUARY ▲▲▲

ARTHUR C. WOODS, organizer of the A. C. Woods Co., Rockford, Ill., structural steel fabricator, died Oct. 12 following a short illness. Mr. Woods was born in 1877 at Evansville, Ind. He was graduated from Purdue University in 1898, and organized the company bearing his name in 1914.

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THOMAS H. MCKINNEY, president and part owner of the McKinney Steel & Sales Co., North Chicago, Ill., died Oct. 24, after an illness of 18 months. Mr. McKinney was one of the men instrumental in establishing North Chicago as an industrial city and had been a resident of North Chicago for 30 years.

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JAMES ALONZO WHITCOMB, inventor and manufacturer of Kenosha, Wis., died suddenly of heart disease on Oct. 20 while visiting at his native city of Beatrice, Neb. He was 51 years of age. After spending 20 years as machine shop superintendent in the Kenosha works of the American Brass Co., Mr. Whitcomb in 1917 established the Kenosha Wheel & Axle Co. and the Whitcomb Wheel Co., manufacturing automotive units, parts and equipment.

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ADOLPH FREDERICK GARTZ, retired official of Crane Co., died on Oct. 29 at his home in Altadena, Cal. Mr. Gartz was born in New York in 1862. He joined the Crane Co. at the age of 26 and later became treasurer.

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THEODORE E. PENNOCK, president and general manager of the Standard Automatic Machine Co., died at his home in Rochester, N. Y., on Oct. 22, aged 44 years.

National Tube Co. Installs Drying Furnace

A continuous Bessemer converter bottom-drying furnace, recently placed in operation at the National works, National Tube Co., McKeesport, Pa., is said to be the only one of its kind in existence. It is constructed and operated on the principle of a tunnel kiln. The furnace is 150 ft. in length, and has a capacity of 1125 converter bottoms in 48 hr. It was designed and built by the Rust Engineering Co., Pittsburgh.

The latter company has also recently installed three triple-fire continuous slab-heating furnaces in the plate mill of the Republic Steel Corpn. at Youngstown. Exceptional results are being obtained from these furnaces because of the uniform heating obtained in the discharged slabs. The design of the furnace provides an independent soaking chamber at the discharge point, in which the steel is equalized throughout, thus eliminating gage variations in the finished product. The furnaces are fired with either producer gas or coke oven gas, and each has a normal capacity of 20 tons an hour.

A continuous pack heating furnace has been installed at the Park works, Pittsburgh, of the Pittsburgh Crucible Steel Co. This is the first of its kind to be designed and constructed for this specific use with rustless steel packs. The ordinary pack furnace requires a temperature in the pack of approximately 1400 deg. Fahr., whereas the rustless packs require a temperature of 2000 deg. At the same plant the Rust company has installed also six sheet-heating furnaces, likewise for use with the new alloy mill.

Other recent installations by the same company include a triple-fired blue heating furnace at the new structural mill of the Weirton Steel Co., Weirton, W. Va.; two triple-fired, zone-controlled, continuous billet heating furnaces at the Fairfield, Ala., plant of the American Steel & Wire Co., and a roll annealing furnace at the Ellwood City, Pa., plant of the Aetna Standard Engineering Co.

Electrochemists to Meet in New York Nov. 21

The regular autumn meeting of the New York section of the American Electrochemical Society will be held on Friday evening, Nov. 21, in No. 309 Havemeyer Hall at Columbia University, New York. There will be two principal addresses; the first one will be delivered by Dr. Beverly L. Clarke of the Bell Telephone Laboratories, New York, who will take as his subject "Potentiometric Titrations in Non-Aqueous Solvents." The other address will be by Prof. Dwight K. Alpern, formerly of Swarthmore College, who will discuss "Photo-Voltaic Cells." There will be a demonstration of these novel electrolyte photo-electric cells, together with their striking practical uses and their operations compared with ordinary photo-electric cells. Columbia University has extended to the society the privileges of the Faculty Club at 118th Street and Morningside Park West, where an informal dinner at 6.45 p. m. will precede the meeting.

William W. Hearne, Inc., Philadelphia, an old-established merchant distributer of pig iron, coke, ferroalloys, etc., has moved from Real Estate Trust Building to 814 Pennsylvania Building.

Machine Tool Business Not Improving

Orders and Inquiries Do Not Indicate An Early Pick-Up

REPORTS of a week ago that machine tool business in October probably declined from that of September are borne out by more detailed information received this week from trade sources.

Only at Cleveland are there any signs of a gain in the volume of prospective business, but there, as elsewhere, it is probable that the tools for which inquiries are now being issued may not be bought until after the first of the year.

November and December are traditionally months of low buying of machine tools, inventory considerations causing many manufacturers to postpone contemplated purchases to the new year. As general business shows no convincing signs of recovery, the slowness of the final two months of the year is likely to be more pronounced this year than usual.

An improvement in machine tool business hinges on a sufficient pick-up in general manufacturing lines to induce tool users to make plans with confidence. As such confidence is still lacking, the immediate outlook is not bright.

New York

Demand for machine tools has shown no improvement. On the contrary, the general report from dealers and manufacturers' representatives is that the past week has shown a decline in both orders and inquiries. As the final two months of any year are traditionally a period of restricted buying of machine tools, chiefly because of inventory considerations, it is not expected that there will be any improvement until some time after the first of the year. Just how long the present dull period may continue depends, of course, to a large extent on the recovery of general manufacturing business. The time when such recovery may be expected is still uncertain.

New England

While machine tool sales are practically nil, there is an accumulation of evidence that a buying movement lies ahead, although no indication as to when it will start. Dealers continue to make proposals, an indication that industry is preparing to buy tools. Allied with the more numerous proposals are signs of returning machine shop and manufacturing plant activities, sparsely placed, to be sure, yet definite. The Boston & Maine Railroad is about to add 200 to its mechanical forces; the Central Vermont Railroad shops are now on full time and adding workers to its payroll; the Fafnir Bearing Co., New Britain, Conn., has a comfortable backlog of railroad work and is reported to have or is about to close with two or three automobile companies for sizable contracts; other New England concerns doing automobile work expect to be busier before Jan. 1. The textile industry is staging a comeback following a protracted period of demoralization. The Crompton & Knowles Loom Works, Worcester, Mass., plans to recall many employees. The Draper Corpn., Hopedale, and the Whitin Machine Works, Whitinsville, Mass., while making no promises of increasing working forces, regard the outlook as more hopeful.

Chicago

Although difference of opinion existed a week ago, there is now general accord among dealers that October was close to, if not actually, the lowest month of the year in inquiries, orders and billings. The future looks no brighter. November is normally a quiet month, industrial activity shows very moderate change and such business as is available is confined to small and scattered lots. Dealers' mails are light in inquiries and orders, but salesmen's personal contacts are not wholly without results. Here and there a railroad asks for preliminary prices, indicating that the work on 1931 budgets is still under way. A number of machine tool manufacturers are now reducing operating forces after having built up sizable stocks of standard tools which are available on short notice.

Cleveland

Outlook in the machine tool market is somewhat brighter than recently as some buyers report an increase in inquiry for their products and are showing more interest in new equipment. More activity has developed in the Akron district among metal-working plants that serve the rubber industry. Some plants have informed dealers that they will buy new machinery, but will not place orders until after the first of the year. Sales during the past week were very light and several dealers report that their volume of business in October fell below that of September.

The Cleveland Board of Education has purchased four 14-in. x 6-ft. lathes for the East Technical High School.

Cincinnati

Demand for machine tools has district continues to drag. In fact, manufacturers say that October bookings were lower than those of September, and no improvement is anticipated before the middle of the first quarter. All plants, except one manufacturer of boring mills, are operating on greatly reduced schedules. A check-back on recent inquiries by local manufacturers indicates that, while consumers are still interested in making purchases, they are forced to retrench because of the dullness of business generally.

Milwaukee

Although October started out in a manner of activity that presaged at least a small gain in machine tool business over that of September, the lagging tendency of trade during the last half of the month thwarted the expected increase. Some shops equalled the volume of business of the preceding month, but others say it was one of the poorest of the year. The fact that inquiry is holding up well is seen as an encouraging sign, but prospective purchasers are slow in closing, and then only for their most pressing needs. It is estimated that replacements constitute more than 95 per cent of sales. Demand for used tools is only fair.

Pittsburgh

Business in this district is marking time, and the new month is not expected to bring an increase in activity in the local machinery trade. Dealers believe that some tool purchases may be made by railroads before the end of the year, but no formal inquiry has come from the Pennsylvania or the Baltimore & Ohio, which have announced large freight car building programs for their own shops.

Orders for tools are confined principally to single items.

New York

CONTRACT has been let by Corn Products Refining Co., 17 Battery Place, New York, to Bedford Construction Co., 200 East Illinois Avenue, Chicago, for addition to power plant at North Kansas City, Mo., to cost over $75,000 with equipment.

Great Atlantic & Pacific Tea Co., 420 Lexington Avenue, New York, has leased one-story building, 110 x 323 ft., to be erected by New York, New Haven & Hartford Railroad, on East 132nd Street, for new storage and distributing plant, to cost over $200,000 with equipment. General contract has been let to Austin Co., 120 Broadway.

Crane Co., 836 South Michigan Avenue, Chicago, has plans for a three-story and basement factory branch, storage and distributing plant, 170 x 175 ft., with pipe and mechanical shop, at Long Island City, to cost more than $250,000 with equipment.

Bird Aircraft Corporation, 17 Haverkamp Street, Glendale, L. I., formerly Brunner-Winkle Aircraft Corporation, is planning removal of plant to Oklahoma City or Tulsa, Okla., where expansion will be carried out. Major Thomas G. Lanphier, president, is now in Oklahoma City to select site.

Halloran's Brass Foundry, Inc., has been formed to take over and expand foundry of Patrick J. Halloran, 184 Broadway, Long Island City, specializing in production of brass, bronze and other metal castings. Mr. Halloran heads new organization.

General Electric Co., Schenectady, N. Y., has plans for multi-story factory branch, storage and distributing plant at Detroit, to cost over $500,000 with equipment.

Julius Bleich, 4758 Third Avenue, New York, architect, has plans for a two-story automobile service, repair and garage building, 110 x 145 ft., to cost close to $100,000 with equipment.

Behrer & Co., 77-79 Beekman Street, New York, plumbing equipment and supplies, have filed plans for a two-story storage and distributing plant at Harrison, N. Y., to cost about $125,000 with equipment. Project will include an automobile service, repair and garage unit. John E. Nitchie, World Building, New York, is architect.

Sensitive Research Instrument Corporation, 142 East Thirty-second Street, New York, is planning new one-story plant, 60 x 135 ft., to cost about $40,000 with equipment.

Eric F. Burtis, 71 Baldwin Avenue, Baldwin, N. Y., and associates have organized Cutlery Craftsmen, with capital of $50,000, and plan operation of local factory for manufacture of scissors, shears and other cutlery.

De Pace & Juster, 151 West Forty-sixth Street, New York, architects, have plans for an eight-story industrial and warehouse building, 200 x 267 ft., with floor units for heavy machinery service, to cost $1,500,000.

Bucyrus-Erie Co., South Milwaukee, manufacturer of cranes, power shovels, excavators, etc., has awarded general contract to James L. Bried, West Street, Eglewood, N. J., for a one-story factory branch, service and distributing plant at Englewood, to cost over $35,000.

Universal Metal Products, Inc., Newark, recently organized, has leased one-story factory at 792-802 North Sixth Street, for manufacture of sheet metal products. L. B. Haigh is president.

Public Service Coordinated Transport, Inc., Public Service Terminal, Newark, has applied for permission to issue notes in amount of $6,000,000, proceeds to be used for new buildings for traction lines and motor buses, increase in shop facilities, purchase of equipment, etc. Public Service Electric & Gas Co., an affiliated organization, is planning construction of a steel tower transmission line in Morris County, near Split Rock.

Weldon Roberts Rubber Co., 18 Oliver Street, Newark, manufacturer of general rubber goods, will soon take bids for extensions and improvements in two-story plant to cost over $35,000. Marshall N. Shoemaker, 10 Bleeker Street, is architect and engineer.

Board of Education, Linden, N. J., is contemplating installation of manual training equipment in two-story addition to high school, to cost about $375,000, for which bids will soon be asked on general contract. L. M. Dennis, office of H. B. Brady, Inc., 333 North Broad Street, Elizabeth, N. J., is architect.

Alfred Horlbeck, 100 Hague Street, Jersey City, N. J., manufacturer of lighting fixtures, etc., has organized Horlbeck Metal Crafts, Inc., with capital of $25,000 to take over and expand present business, including production of other metal goods.

New England

PLANS have been filed by Dewey & Almy Chemical Co., 235 Harvey Street, Cambridge, Mass., manufacturer of industrial chemicals, etc., for one-story addition, to cost about $60,000 with equipment. Henry L. Kennedy, 80 Boylston Street, Boston, is architect and engineer.

American International Engineers & Equipment Associates Syndicate, Boston, care of Hubert Hodson, 53 State Street, engineer, has plans for a railroad, marine

INDUSTRIAL ACTIVITY

Prospects Revealed by a Survey of Construction Projects

NEW construction of the past week requiring machinery and other equipment totals about $42,000,000 (apart from large-scale enterprises dependent on bond issues for $10,000,000 more). This compares with $32,000,000 last week and $53,000,000 two weeks ago. The weekly average in October was $56,000,000, against $35,000,000 in September.

Of the week's total $3,000,000 is in metal-working plants, $4,100,000 in other manufacturing plants, nearly $4,000,000 in school projects calling for machinery, $5,000,000 in railroad and other terminal and shop projects, $22,000,000 in electric power plants, $2,100,000 in water works and some $2,000,000 in miscellaneous items, such as a grain elevator at Kansas City ($650,000), seven storage and distributing plants ($680,000), etc.

Largest of all the industrial projects is that for a can manufacturing plant, to cost $1,500,000, at Camden, N. J. The General Electric Co. is to build a $500,000 plant at Detroit and a $1,500,000 building, for heavy manufacturing, is to go up for unnamed interests in New York. A dairy plant in Pittsburgh calls for $500,000. A paper mill at San Francisco, a phosphate plant in Florida and a metal-working unit in Long Island City will require from $250,000 to $300,000 each.

In the electric power field the largest unit is a $14,000,000 project for the Public Service Co. of Northern Illinois. The San Joaquin power interests in California will erect a $4,600,000 plant to augment present capacity. And a power plant for a copper mining property will go up for the Calumet & Hecla Ahmeek mine, at a cost of $1,500,000.

Boston is the site for a large railroad, marine and industrial terminal, estimated at $3,000,000, with dry and cold storage facilities, etc. Another large railroad project is that of the Norfolk & Western, near Norfolk, for which $1,893,000 has been authorized.

Massachusetts Institute of Technology leads the educational items, with $2,500,000 for a physics and chemistry building, including a shop where precision instruments will be constructed and maintained, in addition to other mechanical departments. San Francisco has a $650,000 school, with vocational training shops in prospect. A similar project at Linden, N. J., calls for $375,000, while two smaller ones, at $175,000 each, are in the list.

Bond and note issues include $6,000,000 for the Public Service Coordinated Transport, Newark, N. J., for new buildings and motor buses, increase in shop facilities, etc.; $1,500,000 for an electric power plant at Fort Worth, Tex.; $1,250,000 for a water works project at Wilmington, Del., and $1,050,000 for water works extension at Buffalo.

and industrial terminal at Columbia Point, Dorchester Bay, with dry and cold storage facilities, conveying and other handling equipment, to cost over $3,000,000.

Atlas Coil Spring Co., Beverly, Mass., recently organized by Oscar and Hyman Cutler, 8 Franklin Street, Chelsea, Mass., plans operation of factory at Beverly for manufacture of steel springs. Hyman Cutler is treasurer.

J. W. Greer Co., 119 Windsor Street, Cambridge, Mass., manufacturer of bakers' and confectioners' machinery and parts, has work under way on a new plant at Watertown, Mass., to cost over $100,000 with equipment.

Board of Trustees, Massachusetts Institute of Technology, Cambridge, has plans for a four-story physics and chemistry building and laboratories, 60 x 300 ft., with shop for construction and maintenance of precision instruments and other mechanical departments, to cost $2,500,000, in which amount a donation has been received. Coolidge & Carlson, 89 State Street, Boston, are architects; Charles T. Main, Inc., 201 Devonshire Street, Boston, is engineer.

Colonial Mfg. Co., Gardner, Mass., is taking bids for a manufacturing plant for which motors, blowers and other equipment will be required.

Turks Head Coal Co., Inc., Providence, R. I., contemplates a new plant to replace one recently destroyed by fire. Handling equipment will be required.

Moore Special Tool Co., Bridgeport, Conn., has plans for an addition, 35 x 70 ft., to cost $15,000. Considerable machine shop equipment will be required, but purchases will probably be deferred until January.

Milwaukee

WORK as been started by Chicago, Milwaukee, St. Paul & Pacific Railway on a $100,000 unit of West Milwaukee car and locomotive repair shops at Milwaukee, for reclamation of oily waste for all divisions of Milwaukee Road system. Bentley Brothers, Inc., 808 South Pierce Street, will erect building, 50 x 70 ft., and Heil Co., 1290 South Thirty-first Street, has contract for stationary and portable steel tanks and other containers, oil-burning equipment, etc.

Duluth branch of Worden-Allen Co., Milwaukee, has general contract for construction of a $60,000 power plant at Newport mine near Ironwood, Mich., for Youngstown Sheet & Tube Co.

Plant of Romart Mfg. Co., Oakfield, Wis., manufacturer of air compressing equipment for garages, filling stations, etc., was damaged by fire Oct. 28, with loss of about $20,000. Immediate replacement is contemplated.

Contracts have been placed by Weimer Welding & Cutting Co., 309 Fourth Street, Milwaukee, for a shop extension, 25 x 100 ft., one-story and part basement.

A. L. Kiefer Co., 329 East Water Street, Milwaukee, has placed general contract with Immel Construction Co., 19 West Division Street, Fond du Lac, Wis., for new two-story factory, 68 x 88 ft., to cost $45,000 with equipment.

Eau Claire Sand & Gravel Co., Eau Claire, Wis., is taking bids for new mineral aggregates plant costing $100,000, to replace unit burned in September. Contracts also have been let for a new sand drying plant at its No. 2 plant in Chippewa Falls, Wis., to cost about $40,000.

Executive offices of Wisconsin Rapids, Wis., works of National Carbonic Machinery Co. were transferred Nov. 1 to Chicago and consolidated with main executive offices at 815 Larrabee Street. Wisconsin Rapids plant is operating day and night shifts in production of newly designed cooling and ventilating units.

Recent crane orders booked by Milwaukee Electric Crane & Hoist Corpn., Milwaukee, division of Harnischfeger Corpn., include Lehigh Valley Railway, one 30-ton gantry, one 30-ton and one 20-ton low head; Grand Trunk Railway, one 25-ton gantry; Newport News shipyard, one 10-ton trolley; Moise Steel Co., Milwaukee, one 10-ton trolley; Belle City Malleable Co., Racine, Wis., one 3-ton trolley. Company's business this year, up to middle of October, exceeded entire 1929 volume, according to D. B. Patterson, general manager.

Pittsburgh

OVENS, power equipment, conveying and other machinery will be installed in new three-story plant to be erected by Seven Baker Brothers, 400 Wabash Avenue, Pittsburgh, at Uniontown, Pa., to cost $140,000. Braziell & Anderson, 309 Fourth Avenue, Pittsburgh, are architects.

W. L. James, 1115 Metropolitan Street, Pittsburgh, and associates have organized Alloy Welding & Mfg. Co., with capital of $75,000, and will operate local plant for welding, brazing and fabricating steel tanks and other plate products. Mr. James will be treasurer.

Conveying machinery, automatic bottling and other equipment will be installed by Liberty Dairy Products Corpn., Forbes Street and Sixth Avenue, Pittsburgh, in connection with expansion and improvements to cost about $500,000, including new unit on Northside to cost $250,000 with machinery, additions and improvements to Shadyside and Forbes Street plants to cost $150,000 and $100,000 respectively.

Liberty Explosives Corpn., Mount Braddock, near Connellsville, Pa., is completing new plant to cost over $85,000 and will install machinery for early operation. C. T. Crone is superintendent.

Sharples Solvents Corpn., Belle, W. Va., will carry out improvements at local solvents and commercial alcohol plant, including machinery replacements and repairs. Headquarters are at Twenty-third and Westmoreland Streets, Philadelphia.

Buffalo

BIDS will be received by Department of Correction, State Office Building, Albany, N. Y., until Nov. 26, for new buildings at State prison, Auburn, including foundry, mechanical shop and power plant.

Buffalo Pipe & Foundry Corporation, Buffalo, recently organized by Frank B. Baird, formerly president of Buffalo Union Furnace Co., and now operating cast iron foundry in part of former local plant of American Radiator Co., has arranged for acquisition of Tucker Foundry Co., Medina, N. Y., manufacturer of kindred cast iron products, and will consolidate. Plans are under way for extensions and improvements, at Medina, which will be continued as a branch plant. Mr. Baird will be president of consolidated organization.

S. & E. Heating & Sheet Metal Works, 32 Roetzer Street, Buffalo, has filed plans for a one-story addition for a metal and tin-working shop.

William D. Boswell, 228 Saratoga Street, Cohoes, N. Y., and associates have formed Capitol District Foundry & Machine Co., with capital of $40,000, and will operate local plant for manufacture of brass, bronze, iron and other metal castings and products. James S. Clute, 138 Mohawk Street, is one of organizers.

J. H. Williams & Co., 400 Vulcan Street, Buffalo, manufacturer of drop forgings, etc., has plans for a new one-story plant at Tonawanda, N. Y., to cost over $40,000 with equipment.

Western New York Water Co., 11 Niagara Street, Buffalo, operating water utilities, pumping and power plants, etc., is disposing of a bond issue of $1,050,000, part of proceeds to be used for extensions and betterments.

South Atlantic

CONTRACT has been let by United States Guano Co., Continental Building, Baltimore, to Blaw-Knox Co., Warner and Bayard Streets, for one-story phosphate storage and distributing plant, 130 x 260 ft., to cost about $50,000 with equipment.

Property of E. J. Nelson Kaolin Co., Dry Branch, Ga., has been acquired by new interests, headed by Robert S. Finney, and new company will be organized to operate kaolin lands. Plans are under way for a mechanical washing plant and mill, to cost about $150,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, will take bids at once for air lift pumping machinery and kindred equipment for naval academy at Annapolis, Md. Bids will be received until Nov. 26 for a 40-ton electric gantry crane and runway at navy yard, Mare Island, Cal.

Charlotte Pipe & Foundry Co., Charlotte, N. C., has authorized rebuilding part of plant recently destroyed by fire and will expand former unit for increased output, to cost close to $100,000 with equipment.

Weeks Aircraft Co., Charlotte, N. C., recently organized by Joseph Blythe, Charlotte, and Etting O. Weeks, Milwaukee, is arranging for lease of local airport and plans erection of hangars, reconditioning and repair shop, and other field units. A flying school will be operated. Company is capitalized at $100,000.

Town Council, Fairfax, Va., is planning early call for bids for equipment for municipal waterworks, including a 100,000-gal. tank mounted on 75-ft. steel tower, ditching machine, caulking machine, pumping machinery and other equipment.

Norfolk & Western Railway Co., Norfolk, Va., has authorized an expansion and improvement program to cost $1,892,734, including shop work and building of heavy locomotive equipment to cost $1,100,000; addition to storage and distributing terminal at Lamberts Point, Va., to cost $255,000 with equipment and other work. Company engineering department will be in charge.

Green Valley Flour Mill, Cambridge, Md., operated by Joseph E. Robbins,

plans rebuilding part of mill recently destroyed by fire, with loss about $80,000 including equipment.

United Railways & Electric Co., Court Square Building, Baltimore, has asked bids on general contract for additions and improvements in one-story car house, to cost over $40,000.

Detroit

FORMER plant of Eaton Axle & Spring Co., Pontiac, has been taken over by National Foundry Co., recently organized, and will be remodeled for production of cast iron sewer pipe, manhole covers and kindred iron castings. Beresford Boate, Pontiac, is one of heads of new company and will be plant manager.

General Steel Products Co., Battle Creek, manufacturer of all-steel electric welded motor truck bodies and kindred steel specialties, has arranged for removal of plant to Marshall, where company will occupy part of building of Simon-Leedle Co.

Leonard Refrigerator Co., Grand Rapids, a division of Kelvinator Corpn., 14250 Plymouth Street, Detroit, will develop and market electric refrigerators, expanding line of output heretofore limited to ice refrigerators. Grand Rapids plant will be used in part for manufacture of cabinets, etc., and electric refrigerator units will be produced by Kelvinator organization at Detroit.

Board of Wayne County Road Commissioners, Detroit, has plans for a one-story machine and repair shop at Wyoming, to cost about $25,000 with equipment. Giffels & Vallet, Marquette Building, are architects and engineers.

Duluth, South Shore & Atlantic Railroad Co., Marquette, has approved plans for rebuilding engine house with shop facilities at L'Anse, recently destroyed by fire, to cost about $30,000 with equipment.

Drake-Sorg Boats, Inc., 2206 Twelfth Street, Detroit, recently organized with capital of $100,000 by Theodore R. Drake and Harry C. Sorg, is planning operation of local works for manufacture of motor boats and equipment.

Calumet & Hecla Co., Calumet, has work under way on new steam-operated electric power plant at Ahmeek mill, to cost about $1,500,000 with transmission system. Output will be used at copper mines and mill of company, and for other industrial service. Stone & Webster Engineering Co., 33 South Clark Street, Chicago, and 49 Federal Street, Boston, is engineer.

Concrete Unit Mfg. Co., Industrial Building, Detroit, is planning operation of plant at Leach Road and line of Grand Trunk Railroad, for production of structural precast concrete units, to cost over $40,000 with equipment.

Ford Motor Co., Dearborn, has awarded general contract to Banbrook-Gowan Co., Brewster Street, for one-story addition for hot metal department, to cost over $50,000 with equipment. Giffels & Vallet, Marquette Building, Detroit, are architects and engineers.

Chicago

CONTRACT has been let by Standard Oil Co., Galesburg, Ill., to Galesburg Construction Co., 131 Cherry Street, for one-story bulk oil storage and distributing plant, to cost over $85,000 with equipment.

Star Nipple Co., Chicago, manufacturer of pipe nipples and kindred products, has awarded general contract to Austin Co., 510 North Dearborn Street, for one-story plant to cost about $50,000 with equipment.

Jefferson Paper Bag Co., Chicago, recently organized with capital of $100,000, has leased part of building at 6525 South Laurel Avenue, for new plant for manufacture of paper bags and containers, and will install automatic high-speed machinery and auxiliary equipment for initial output of about 2,000,000 bag units daily. A. T. Roberts and M. N. Miller are heads.

International Rubber Co., care of R. C. Sudbury, manager, Maine Hotel, Pueblo, Colo., has asked bids on general contract for new one-story mill, to cost over $175,000 with machinery.

Skelly Gas Co., affiliated with Skelly Oil Co., Tulsa, Okla., will build a new gas plant at Spencer, Iowa, where franchise has been secured, with main station, pipe lines, distributing equipment, etc., to cost about $125,000.

Board of Public Welfare, City Hall, Minneapolis, is considering new industrial building at municipal workhouse, Parkers Lake, to cost about $100,000 with equipment. Croft & Boerner, 1004 Marquette Avenue, are architects.

Common Council, Grundy Center, Iowa, is arranging a bond issue of $80,000 for a municipal electric light and power plant, for which plans will soon be arranged.

Public Service Co. of Northern Illinois, 72 West Adams Street, Chicago, has authorized appropriation of $1,000,000 for extensions and improvements in plants and system, including transmission line additions, etc. Company has work under way on extension to steam-operated electric power station at Waukegan, Ill., where a fifth generating unit will be installed at a total cost of about $14,000,000. Work will also proceed on a new equipment storage and distributing plant with shop and service facilities near Glencoe, Ill., to cost about $750,000 with machinery.

Clayton, Mark & Co., 2031 West Seventy-fourth Street, Chicago, manufacturers of pipe, etc., have leased 25,000 sq. ft. in neighboring building for expansion, particularly in connection with development of new products; option has been taken on additional space with view to early occupancy.

Iowa City Light & Power Co., Iowa City, Iowa, has approved plans for an addition to power plant at Coralville, Iowa, to cost over $45,000 with equipment.

Cincinnati

PLANS are being considered by Hohman Plating Co., 815 East Fifth Street, Dayton, Ohio, for new three-story plant, 80 x 130 ft., to cost about $80,000 with equipment.

Jaeger Machine Co., 520 Dublin Avenue, Columbus, Ohio, manufacturer of highway machinery and equipment, has awarded general contract to T. J. Schirtzinger, 1353 North High Street, for one-story addition, 105 x 200 ft., to cost over $60,000 with equipment. New unit will be occupied by Lakewood Engineering Co., Berea Road, Cleveland, an affiliated organization, manufacturer of similar equipment, which will remove to new location.

Common Council, Paris, Ky., is considering early construction of a municipal electric light and power plant. A bond issue is being arranged.

Dayton Rubber Co., Dayton, Ohio, has arranged with Rudolph Roderwald Co., Berlin, Germany, for exchange of patent rights on different equipment, including v-shaped flexible belts, etc. Dayton company is arranging facilities for production of a new generator drive equipment for railroad cars, heretofore manufactured exclusively by Roderwald organization.

Schieble Toy & Novelty Co., Bainbridge Street, Dayton, has awarded general contract to Charles H. Shook, Inc., Third National Bank Building, for an addition and improvements in plant, to cost over $40,000 with equipment. Geyer & Neuffer, Ludlow Arcade Building, are architects.

Department of Public Works, Nashville, Tenn., Dr. J. W. Bauman, commissioner, is planning extensions and improvements in municipal waterworks to cost about $450,000 including installation of electric-operating pumping machinery and other power equipment.

Vacuum Oil Co., 61 Broadway, New York, has purchased Queen City Petroleum Products Co., 3629 Colerain Avenue, Cincinnati, operating bulk oil storage and distributing plants, etc., and will operate as a unit of organization. Purchasing company contemplates expansion in present facilities.

Niles Corrugating Co., Niles, Ohio, plans rebuilding part of plant recently destroyed by fire, with loss about $30,000 including equipment.

Philadelphia

CONTRACT has been let by Continental Can Co., 1 Pershing Square, New York, and Campbell Soup Co., Camden, N. J., to Cramp & Co., Inc., Denckla Building, Philadelphia, for six-story can manufacturing plant at Camden, 161 x 339 ft., to cost close to $1,500,000 with machinery. Francisco & Jacobus, 511 Fifth Avenue, New York, are architects and engineers.

L. Wilf & Co., 214 Chestnut Street, Philadelphia, manufacturers of chairs and other furniture, have purchased five-story building at 239 Chestnut Street, 25 x 100 ft., for new plant and will remove to new location and increase capacity.

Penn Scale Mfg. Co., Philadelphia, has been organized to take over and expand company of same name, with plant at 1017 North Front Street. New company is headed by Samuel Black and Harry Pomerantz.

Warner Co., 1518 Walnut Street, Philadelphia, building materials and supplies, sand and gravel, etc., has filed plans for a one-story machinery and equipment repair shop.

State Highway Commission, State House Annex, Trenton, N. J., is asking bids until Nov. 17 for 300 blades for snow plows and graders.

W. G. Savidge and M. W. Trimble, Sunbury, Pa., have organized Savidge Corpn., and will operate local plant for manufacture of nut-locks, bolts and kindred metal products.

Harrisburg Airport, Harrisburg, Pa., Fred Nelson, manager, contemplates extensions in hangar unit to double present capacity, including additional reconditioning and repair facilities.

Alloy Metal Wire Co., Moores, Pa., has plans for an addition in furnace and

pickling departments, to cost over $40,000 with equipment.

Board of Water Commissioners, Wilmington, Del., is arranging fund of about $1,250,000 for extensions and improvements in municipal waterworks, of which about $480,000 will be used for pipe line construction.

Wheeling Corrugating Co., Wheeling, W. Va., will build a one-story warehouse at Briscol and Third Streets, Philadelphia. Building will contain 70,000 sq. ft. of floor space and have railroad siding connecting with Philadelphia & Reading Railroad.

Kruse & Slattery, Inc., manufacturer of dies, tools, jigs, fixtures and special machinery, formerly located at Erie Street, Camden, N. J., has moved to a new plant at 1492-94 Hadden Avenue. Company has installed several new machines, including a Swiss No. 5 jig borer and a Keller BL die sinker.

Reeves Stove & Foundry Co., Twenty-second and Hayes Streets, Camden, N. J., is rebuilding its foundry recently destroyed by fire.

Cleveland

PLANS are being arranged by United States Gypsum Co., Warren, Ohio, for removal of metal lath manufacturing plant to new local unit now in course of completion, comprising a former factory of American Welding Co., and multi-story addition, 100 x 300 ft. Company has been dismantling plant for same line of production at Jeannette, Pa., and will install part of equipment at new Warren works, where metal lath manufacture will be concentrated.

Brainard Steel Co., Warren, Ohio, recently organized to take over local plant of J. W. Brainard, manufacturer of steel barrel hoops and kindred products, has arranged for an increase in capital to $200,000 and will carry out expansion for production of other steel and iron specialties. Theodore W. Sproull heads new organization.

Officials of United States Rubber Co., Akron, Ohio, and Samson Tire & Rubber Co., Los Angeles, have organized a new company with capital of $2,000,000 and 400,000 shares common stock, no par value, to take over and consolidate Western branches of first noted company and California plants of Samson organization. Consolidated organization will carry out expansion for automobile tires and tubes, and other rubber goods manufacture.

Waite & Bartlett X-Ray Mfg. Co., Cleveland, has been organized with a capital of 200 shares of stock, no par value, by officials of Waite & Bartlett Mfg. Co., 53 Jackson Avenue, Long Island City, N. Y., manufacturer of X-ray apparatus and other precision equipment. New company will operate as a subsidiary and has leased space in building on East Thirtieth Street, Cleveland, for new plant. W. Stainkamp will be in charge of new works. Dr. H. F. Waite is president.

St. Louis

BIDS will soon be asked by Board of Public Service, St. Louis, for one-story hangar at municipal airport, 90 x 120 ft., with two lean-to extensions, each 16 x 120 ft., with reconditioning and repair facilities, to cost about $40,000 exclusive of equipment. Albert Osburg is architect for board.

City Ice Co., Twenty-first and Campbell Streets, Kansas City, Mo., has awarded general contract to Morley Brothers Construction Co., 1643 Belleview Avenue, for extensions and improvements in ice-manufacturing plant No. 1, to cost over $50,000 with equipment. Charles A. Smith, Finance Building, is architect.

State Board of Control, Capitol Building, Lincoln, Neb., has awarded general contract to R. Butke, 5013 North Twenty-second Street, Omaha, Neb., for one-story manual training building at State school for deaf, Omaha, to cost close to $60,000 with equipment. Lawrie & Stockham, Paxton Building, Omaha, are architects.

Fountain & Fixture Co., 629-31 West Second Street, Oklahoma City, Okla., has filed plans for one-story addition, 50 x 70 ft., for storage and distribution, to cost about $18,000 with equipment.

Missouri Pacific Railroad Co., Thirteenth and Olive Streets, St. Louis, is planning erection of grain elevator at Kansas City, Mo., to cost over $650,000 with elevating, conveying, screening and other equipment.

Shawnee Copper Mining Co., Eminence, Mo., with properties on Shawnee Creek, about six miles distant, is planning erection of new concentrating plant, to cost over $100,000 with machinery.

United Light & Power Corpn., Abilene, Kan., has awarded general contract to C. F. Fossler, Abilene, for one-story repair shop, 40 x 50 ft., in conjunction with one-story and basement automobile service, repair and garage building, 40 x 100 ft., for company trucks and cars, to cost over $40,000 with equipment.

Omaha Road & Equipment Co., Twelfth and Davenport Streets, Omaha, Neb., has plans for a storage and distributing plant for machinery, with loading dock, 57 x 130 ft., to cost about $30,000 with conveying and other handling equipment. Harvey C. Peterson, Banker's Reserve Life Building, is architect.

Quix-Kold Corporation, Oklahoma Savings & Loan Building, Oklahoma City, plans one-story ice-manufacting plant at Norman, Okla., to cost about $45,000 with equipment.

Reagan Brick Co., Hales Building, Oklahoma City, Okla., has plans for new works on 20-acre tract on West Sixty-fourth Street, to cost over $200,000 with power house, machine shop and other units. A. W. Kenyon is in charge of construction.

White River Power Co., Pine Bluff, Ark., has secured permission to proceed with hydroelectric generating stations on White River. Power dams will be built at three points, near Cotter, on North Fork of White River, and third station at another point on North Fork of river. Entire project will cost over $47,000,000 with transmission lines.

Indiana

IN connection with recent acquisition of plant of Martin-Parry Corpn., Indianapolis, manufacturer of automobile bodies, by Chevrolet Motor Co., Detroit, first noted company has retained metal stamping plant and plans early removal of that unit to main works at York, Pa.

Indiana Electric Corporation, Indianapolis, has applied for permission to acquire a group of electric light and power and gas properties at Noblesville, Stilesville and vicinity, heretofore operated by Central Indiana Power Co., for price of $654,000, and plans expansion in that territory, including transmission lines.

City Council, Fort Wayne, is considering extensions and improvements in municipal waterworks, including installation of pumping and power equipment, filtration equipment, etc., to cost over $1,500,000. Hood, Becker, Shoecraft & Drury, Ann Arbor, Mich., are consulting engineers.

Rock Wool Products Co., Wabash, recently organized with capital of $50,000 by Charles and Clyde Latchem, both of Wabash, plans erection of local mill for manufacture of special insulating products, to cost over $35,000 with equipment.

Allen C. Disher and Dwight A. Elliott, Richmond, have organized Disher-Elliott Mfg. Co., and will operate local plant for manufacture of metal products of various kinds.

Gulf States

PLANS are being considered by Marquette Cement Mfg. Co., 140 South Dearborn Street, Chicago, for storage and distributing terminal at Vicksburg, Miss., where waterfront site has been selected, including loading dock, elevating, conveying and other handling equipment, to cost over $85,000.

Tom Huston Frozen Foods, Orlando, Fla., recently organized by Tom Huston, Columbus, Ga., and associates, plans local factory, to cost over $100,000, with refrigerating equipment, conveying and other machinery. C. C. Street is local manager in charge.

Texas - Louisiana Power Co., Fort Worth, Tex., has arranged for a bond issue of $1,500,000, part of proceeds to be used for extensions and improvements in plants and system.

City Council, Perryton, Tex., is planning purchase of property near city limits for municipal airport, with hangar, reconditioning and repair shop and other field units.

Richland Parish School Board, Rayville, La., is considering installation of manual training equipment in new one-story and basement high school to cost $175,000, for which bids have been asked on general contract. Edward F. Neild, City Bank Building, is architect.

Atlantic Ice & Coal Co., Myrtle Avenue, Jacksonville, Fla., is planning extensions and improvements in cold storage and refrigerating plant, to cost about $70,000 with machinery. F. W. Beazley is president.

International Agricultural Chemical Corporation, 61 Broadway, New York, has plans for a new phosphate plant at Mulberry, Fla., to cost over $250,000 with equipment. Company engineering department is in charge.

Sewerage and Water Board, 426 Carondelet Street, New Orleans, is planning early call for bids for new pumping plant for municipal waterworks, to cost about $175,000 with machinery. A. G. Moffat is secretary.

Electric oven equipment, conveying and other machinery will be installed in addition to plant of Alabama Packing Co., Birmingham, meat packer, to cost $45,000.

Cytro-Products Co., Bradentown, Fla., has plans for one-story plant, 50 x 150 ft., for manufacture of fertilizers, to cost

over $30,000 with conveying and other equipment. L. E. Bissel is head.

Board of Education, Odessa, Tex., plans installation of manual training equipment in new three-story high school to cost about $175,000, for which plans are being drawn by Peters, Strange & Bradshaw, Big Springs, Tex., architects.

Pacific Coast

PLANS have been approved by San Joaquin Light & Power Corpn., Fresno, Cal., for a new steam-operated electric generating plant on San Joaquin River at Herndon, about 10 miles from Fresno, to cost $4,600,000 with transmission lines. Company engineering department is in charge.

La Tourneau Mfg. Co., Moss Street, Stockton, Cal., manufacturer of road-building and earth-moving machinery and parts, will proceed with construction by day labor on new one-story plant, to cost about $50,000 including equipment, to include parts manufacture and assembling. Company engineering department is in charge.

Western Metalcrafts Co., Vernon, Los Angeles, has awarded general contract to Morgan Lupher, Citizens National Bank Building, for one-story plant, 100 x 100 ft., with office, 50 x 60 ft., adjoining, to cost about $50,000 with equipment.

Copperconda Co., California Building, Los Angeles, is contemplating erection of new plant at Santa Ana, Cal, for production of zinc oxide and kindred products, to cost over $100,000 with equipment.

Rheem Mfg. Co., Emeryville, Cal., manufacturer of steel drums, etc., has secured seven acres at South Gate, near Los Angeles, for new one-story plant, 210 x 400 ft., to cost over $100,000 with equipment. Unit is expected to be ready for service in February.

Board of Education, San Francisco, in conjunction with County Board of Education, Court House, will soon take bids for a three-story and basement junior high school at Noe and Twenty-fifth Streets, with vocational training shops, to cost $650,000. Crim, Resing & McGuinness, 488 Pine Street, are architects.

Inland Empire Paper Co., Spokane, Wash., has awarded general contract to Austin Co., Seattle, for addition to mill at Millwood, near Spokane, including improvements in present units, to cost close to $300,000 with equipment. W. E. Rosebush is treasurer and general manager.

Oregon Pulp & Paper Co., Salem, Ore., has plans for an addition to cost over $65,000, including unit for storage and distribution.

Adolph Lindstrom, Astoria, Ore., operating a boat-building and repair works at foot of Thirty-third Street, has plans for a new one-story repair shop, to cost close to $20,000 with equipment.

Pacific Sea Food Co., Hoquiam, Wash., is planning to rebuild part of canning plant recently destroyed by fire with loss about $50,000 including equipment.

Foreign

PLANS are under way by Trefileries & Laminoirs, Havre, France, manufacturer of copper products, etc., for new electrolytic copper refinery for production of material for company requirements, to cost over $2,000,000 with machinery. It is understood that American Smelting & Refining Co., 120 Broadway, New York, will furnish technical assistance in connection with project.

United Fruit Co., 17 Battery Place, New York, has permission from Government Sugar Board at Kingston, Jamaica, to erect a local cane sugar refinery to operate under a new process, to cost over $500,000.

Societe Chimique de la Grande-Paroisse, Paris, France, is planning construction of plant at Grand-Quevilly, near Rouen, France, for manufacture of synthetic ammonia, utilizing gas from local coke ovens of Hauts-Fourneaux de Rouen, to cost over $500,000 with machinery.

Hawaiian Pineapple Co., Honolulu, T. H., is planning construction of a new can plant, part of unit to be used for storage and distribution, to cost over $450,000 with equipment. Company will also build factory for production of citric acid to cost about $30,000 with machinery.

Philips Incandescent Lamp Co. (Philips Gloeilampenfrabrieken), Amsterdam, Holland, manufacturer of electric lamps and kindred products, is arranging for a bond issue of about 30,000,000 guilders (about $12,000,000), part of fund to be used for expansion.

Distribution d'Electricite, Paris, France, operating electric light and power properties, has arranged for a new stock issue of 400,000 shares, par value 250 fr. (about $10), part of gross fund, about $4,000,000, to be used for extensions and improvements. Company has recently increased its capital from 100,000,000 to 200,000,000 fr. ($4,000,000 to $8,000,000.)

Steel Equipment and Construction, Ltd., 113, Benares Road, Salkia, Howrah, India, is in the market for equipment for manufacturing steel furniture.

New Trade Publications

Industrial Locomotives. — General Electric Co., Schenectady, N. Y. Circulars GEA-1229, 1230A, 1286 and 1287, illustrate and describe several types of industrial haulage locomotives—60 and 85-ton trolley type, gas-electric type of 30-ton capacity, and 85-ton trolley with storage-battery type. Tables of dimensions, ratings, and weights are given.

Remote Manual Control System.— Brown Instrument Co., Philadelphia. Bulletin 7520 of 12 pages, devoted to the de Florez system of remote manual control, which is said to be extremely flexible and sensitive. Illustrations show transmitting and receiving mechanisms.

Dividing Machines.—R. Y. Ferner Co., Investment Building, Washington, United States representative of the Société Genevoise D'Instruments de Physique, Geneva, Switzerland. Catalog 508 of 35 pages illustrates and describes high-precision linear and circular dividing machines for use in laboratories and workshops. Charts giving specifications and dimensions are included.

Unit Heater.—Buffalo Forge Co., Buffalo. Circular 2768 of four pages, illustrated, shows Model "B" Breezo-Fin unit heater—a small, suspended type unit for industrial use.

Unit Heaters.—Wolverine Tube Co., Stephenson Building, Detroit. Booklet of 29 pages, illustrating and describing forced-draft heat machines, or unit heaters, especially adapted to industrial plants, where advantage may be taken of having outside air projected into the building, heating the air at the same time.

Induction Motors — Allis-Chalmers Mfg. Co., Milwaukee. Leaflet 2124, four pages, illustrates and describes type "Arz" totally inclosed fan-cooled squirrel cage motors, suited for locations where dust, dirt, acid fumes or moisture tend to shorten the life of motor windings.

Conveyor Ovens.—Despatch Oven Co., 622 Ninth Street, S. E., Minneapolis. Bulletin No. 10, four pages, featuring elevated and tunnel-type conveyor ovens, used for baking and drying processes, to reduce handling costs and increase production.

Storage Tanks and Containers.— American Welding Co., Carbondale, Pa. Bulletin 2002 of eight pages, illustrated, giving details of construction and other data on Rowland forge welded containers for compressed gases and liquids. Bulletin 3003, also illustrated, giving details of forge welded storage tanks, and pressure vessels for other purposes.

Oil Burners.—Hauck Mfg. Co., 126 Tenth Street, Brooklyn, N. Y. Folder 403 describing and illustrating the Hauck venturi triple atomizing low-pressure oil burner, designed for use with preheated or recuperated air, with or without automatic temperature controls.

Universal Gear Shaper.—National Tool Co., Cleveland. Bulletin of 16 pages, illustrating and describing a universal gear shaper in four sizes, capable of handling spur and spiral gears, using the same straight-tooth cutter.

Electric Traveling Crane.—Whiting Corporation, Harvey, Ill. Four-page folder, illustrating and describing Hi-Lo electric traveling crane, advantages claimed for which are low headroom, without loss of accessibility or ruggedness, simple design, roller bearings, oil-tight gear case and sturdy gearing.

Mercury Contact Flashers.—Reynolds Electric Co., 2650 West Congress Street, Chicago. Bulletin 48 describes a line of flashers equipped with mercury switches, commonly used by sign manufacturers, lighting companies and contractors.

Transmission Belt.—Medart Co., St. Louis. Bulletin of 11 pages describes the V-belt drive for power-transmission machinery of every kind, including many important rope drive installations.

Portable Belt Conveyor.—Link-Belt Co., Philadelphia and Chicago. Folder No. 1248, on the "cub" portable belt conveyor, describes the machine and its parts, and gives a comprehensive list of the many industries in which this type of unit has been used.

Stockholders Seek Action on Bethlehem Bonuses

Recent disclosures of the large bonuses paid to executives of the Bethlehem Steel Corpn. have resulted in the initiation of a movement by the minority stockholders' committee of the Midvale Co., Philadelphia, to secure "protective action" for the stockholders of the Bethlehem company.

The Midvale committee has been in existence for more than five years, having been created after the sale of most of the assets of the old Midvale Steel & Ordnance Co. to Bethlehem. Stockholders of the Midvale Steel & Ordnance Co. received 950,000 shares of Bethlehem stock in exchange for their holdings, and many of them still retain substantial amounts of Bethlehem stock. A letter addressed to the stockholders of the Midvale Co., which was sent out last week, reads as follows:

Several of the Midvale minority stockholders who have adhered to your committee and who are also common stockholders of Bethlehem Steel Co. have discussed with the chairman of your committee the recent exposures in the press relating to the Bethlehem Steel Co. Inasmuch as holders of Midvale Co. stock are generally also holders of Bethlehem Steel Co. common stock (having received Bethlehem steel common stock and Midvale Co. stock for their original Midvale Steel & Ordnance Co. stock), the feeling has been expressed that the Midvale stockholders who have adhered to your committee should consider means of cooperation for the protection of their interests as Bethlehem Steel Co. common stockholders. This letter is addressed to you as one of such stockholders. A question has been raised whether moneys said to be approximately $36,000,000, heretofore distributed as bonuses to the officers and directors of the Bethlehem Steel Co., were lawfully expended; whether the payment of such bonuses should not be discontinued and whether the moneys heretofore paid out should be returned to the treasury of the corporation. Manifestly the determination of these questions would vitally affect the value of the Bethlehem common stock.

We would be glad to have you as a stockholder of Bethlehem Steel Co., and who as a Midvale Co. minority stockholder has adhered to the committee, express your opinion on the advisability of the organization of a committee for the protection of the interests of the Bethlehem Steel Co. common stockholders, and also whether you desire us to take charge of the organization of such a committee.

The letter was accompanied by a notice, which stockholders were asked to sign, indicating that "in view of the recent exposures relating to the conduct of the affairs of the Bethlehem Steel Corpn., concerted action of the common stockholders of that company is necessary for the proper protection of their interests."

Disclosures of the Bethlehem bonus payments were made in the trial of the Youngstown Sheet & Tube Co.-Bethlehem Steel Corpn. merger suit. It was revealed that President E. G. Grace of Bethlehem received a bonus in excess of $1,600,000 in 1929. The $36,000,000 figure used by the Midvale committee probably refers to the total of all bonus payments made by Bethlehem to its executives over a period of 13 years.

Bethlehem Profits Small; No Gain in Sight

Although reporting earnings of only 63c. a share on the common stock in the third quarter, directors of the Bethlehem Steel Corpn. continued the regular dividend of $1.50 a quarter at their meeting in New York on Oct. 30.

Total income for the period was $8,943,217, compared with $13,025,558 in the second quarter and with $17,710,173 in the first quarter. Net income, after payment of interest charges and allowances for depreciation, etc., was $3,783,425, compared with $7,691,495 in the second quarter and $11,384,720 in the first quarter.

With the 63c. profit in the third quarter, the total amount earned by Bethlehem in the nine months for the common stock was $5.09 a share. As President Grace stated after the meeting that the fourth quarter would be no better than the third, the company may fall short by a slight margin of earning its $6 dividend rate for the year.

Mr. Grace's comments on the business situation, which were made to newspaper men after the directors' meeting, attracted wide attention. He stated frankly that Bethlehem's business is not picking up, that the present operating rate is 51 per cent and that there is nothing to indicate that Bethlehem's business or operations will be better during November. He called attention to the fact that Bethlehem has not held its own during the past month in orders on the books, and that operations at the end of October were lower than at the beginning of the month.

Asked whether he saw any signs of an improvement in steel business in the first quarter of next year, Mr. Grace replied that there was nothing yet in sight upon which to base any forecast. He added that, aside from rails, there has been very little buying that calls for first quarter delivery.

His chief reason for some degree of optimism, he stated, was that steel prices apparently have reached a point of stabilization. The downward trend during the third quarter was reflected in the billing prices on shipments by Bethlehem as compared with those during the second quarter.

Unfilled orders of Bethlehem as of Sept. 30 were 446,000 tons, as against 450,000 tons at the end of the second quarter and with 556,000 tons on Sept. 30, 1929. The value of unfilled business as of Sept. 30 last was $64,000,000, compared with $60,000,000 at the end of the second quarter, but this increase is accounted for largely by shipbuilding contracts and not by steel orders.

Mr. Grace repeated what he has said before about the wage situation. He said that the steel industry must not get the idea of economizing through reduction of wage rates and that the maintenance of present wage rates is fundamental in the return of purchasing power when employment becomes more stable.

Financial Reports

Youngstown Sheet & Tube Co., Youngstown, in the quarter ended Sept. 30, had net profit after depreciation, depletion, bond interest and Federal taxes, of $1,708,979, equivalent after preferred dividend requirements to $1.25 a share on the 1,200,000 shares of common stock. This compares with $2,810,345, or $2.17 a share, in the preceding quarter, and $6,756,741, or $6.55 a share, on common stock outstanding in the third quarter of 1929. Net profit in the nine months ended Sept. 30 amounted to $7,036,030, or $5.34 a share, compared with $17,294,114, or $16.67 a share, on common stock outstanding in the first nine months of 1929.

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Inland Steel Co., Chicago, reports net profits for the third quarter of $778,352.43, compared with $2,620,299 in the second quarter and $2,721,317 in the first quarter of this year. The regular dividend of $1 for the quarter on the common stock was declared.

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Wheeling Steel Corporation, Wheeling, W. Va., in the quarter ended Sept. 30, had net profit available for dividends after depreciation, bond interest, etc., of $304,374, compared with $1,511,711 in the corresponding 1929 period. In the first nine months of 1930 net profit amounted to $2,655,955, compared with $5,912,919 in the first three quarters of 1929. The company has declared a quarterly dividend of 50c. a share on common stock, placing it on a $2 annual basis, as compared with $4 previously paid.

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Newton Steel Co., Youngstown, Ohio, had net loss in the September quarter of $238,058, against a profit of $100,893 in the preceding quarter and a profit of $363,242 in the first quarter of 1930. Nine months' net profit amounted to $226,167.

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Superior Steel Corpn., Pittsburgh, had net loss in the quarter ended Sept. 30 of $96,262, compared with a loss of $108,979 in the preceding quarter. For the first nine months of 1930 the company's net loss amounted to $278,621, compared with a profit of $194,451 in the corresponding period last year.

Central Iron & Steel Co., Harrisburg, Pa., has appropriated $40,000 to $50,000 for waste heat boilers to aid in the unemployment situation at Harrisburg.

Lower Prices Prevail in Europe Despite Cartel and Other Agreements

(*By Cablegram*)

LONDON, Nov. 3.

SLIGHT but probably temporary recovery in British trade for next year is forecast by the Federation of British Industries. The federation states that the forces responsible for collapse of world prices appear to have almost spent themselves, and in this sense the bottom of the depression may have been reached. But this does not mean that immediate recovery is in sight or that there will not be further declines in individual groups of prices. The federation believes that present world conditions arise from general overproduction.

Iron and steel markets are depressed, although pig iron is rather more active. Denmark and Italy have increased their purchases of East Coast hematite, enabling the furnaces, [through shipments], to reduce their stocks. Present prices are being upheld, as the makers have yet to take deliveries of foreign ore bought at high rates.

Finished steel is dull. Domestic demand is easing, as structural and engineering contracts are becoming completed and there is little new work, while the export business is negligible.

Tin plate markets are quiet. The conference works are quoting the schedule of 17s. ($4.14), basis IC, f.o.b. works port. Outside works and merchants are accepting less, but there is very little business. Important canners in Australia are holding large stocks of unused tin plate.

Galvanized sheet mills are now shading £12 ($58.39), cost and freight, for India, but buyers are not being attracted. Other markets seem disinclined to pay £11 12s. 6d. (2.53c. a lb.) f.o.b. works port, so that the mills still are badly placed.

Black sheets are in poor demand and the thick gages are easier.

Clyde shipbuilding in October consisted of 18 vessels launched, aggregating 56,000 tons gross register.

Lancashire and Cheshire coal operators representing £20,000,000 capital and 85,000 colliers [miners] are planning to form a merger.

The Bengal Iron Co. and Indian Iron & Steel Co. have formed an arrangement whereby the latter will concentrate on pig iron and the former on pipe, railroad sleepers and castings.

British Federation sees recession about over, but no immediate recovery.

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Russian 1929-30 steel output was about 5,550,000 tons.

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Japan grants patent on Government Steel Works' steel piling.

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Soviet manganese ore sales on Continent reach a high level.

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Reduced buying in Germany and competition from domestic motor cars cause curtailment by American assembly plants there.

On the Continent of Europe

Continental Raw Steel Cartel has been renewed until the end of December, but there is little enthusiasm and works which are pressed for orders are accepting still lower prices. Demand here is poor, as consumers still hold large stocks and have few orders for their own products.

Belgian September pig iron output was 250,000 metric tons; of steel, 246,000 tons. There were 46 blast furnaces operating at the end of September.

Czechoslovakian pig iron output in September was 108,000 tons; of steel, 140,000 tons.

Italian rolled steel in August amounted to 123,000 tons. September pig iron was 45,000 tons, and raw steel, 155,000 tons.

Revised figures for the Russian output in 1929-30 [ended Sept. 30, 1930] give 5,000,000 tons of pig iron, 5,500,000 tons of raw steel and 4,350,000 tons of rolled steel.

Ford's Charge Arouses British Steel Men

LONDON, ENGLAND, Oct. 25.—Sheffield producers of pressed metal, forgings and alloy steels for automobile manufacturers have been greatly surprised by the recent statement of Henry Ford that the company would erect a blast furnace at Dagenham because it could not purchase the right quality pig iron in the quantities required from existing British furnaces

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at $4.8665 (par)

British Prices f.o.b. United Kingdom Ports

Ferromanganese, export	£11	5s.	to	£11	10s.	$54.75	to	$55.95
Billets, open-hearth	5	12½	to	6	5	27.34	to	30.41
Black sheets, Japanese specifications	12	5				59.61		
Tin plate, per base box	0	17	to	0	17¼	4.13	to	4.19
						Cents a Lb.		
Steel bars, open-hearth	7	15	to	8	5	1.69	to	1.79
Beams, open-hearth	7	7½	to	7	17½	1.60	to	1.71
Channels, open-hearth	7	12½	to	8	12½	1.66	to	1.87
Angles, open-hearth	7	7½	to	7	17½	1.60	to	1.71
Black sheets, No. 24 gage	9	0	to	9	5	1.95	to	2.01
Galvanized sheets, No. 24 gage	11	12½				2.52		

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£2	11s.	to	£2	11½s.	$12.41	to	$12.53
Billets, Thomas (nominal)	£3	6s.	to	£3	7s.	$16.06	to	$16.30
Wire rods, low C., No. 5 B.W.G.	5	2½	to	5	7½	24.94	to	26.15
Rails, light	6	0				29.20		
Black sheets, No. 31 gage, Japanese	11	5	to	12	12	54.68	to	58.32
						Cents a Lb.		
Steel bars, merchant	3	19	to	4	1	0.86	to	0.88
Steel bars, deformed	4	2	to	4	3	0.89	to	0.90
Beams, Thomas, British standard (nominal)	3	15	to	3	16	0.82	to	0.83
Channels, Thomas, American sections	5	12	to	5	14	1.24	to	1.26
Angles, Thomas, 4-in. and larger, over ⅜-in. thick	3	14	to	3	15	0.81	to	0.82
Angles, Thomas, 3-in.	3	19	to	4	0	0.86	to	0.87
Hoop and strip steel over 6-in. base	4	17½	to	5	0	1.06	to	1.09
Wire, plain, No. 8 gage	3	15	to	3	17½	0.84	to	0.85
Wire, barbed, 4-pt. No. 12 B.W.G.	9	12½				2.09		
Wire nails, base	5	15				$1.26 a keg		

and that it had encountered considerable difficulty in finding British manufacturers of the commodities which it required to replace similar suppliers in the United States.

It is pointed out by the secretary of the Sheffield Chamber of Commerce that Sheffield makers have specialized in automobile steels since they were first made, and that there is little difference in price between Sheffield quality steels and the cost on the Continent.

British Discuss Standard Building Code

LONDON, ENGLAND, Oct. 25.—A conference on steel structures research held in London resolved that it would be valuable to have a standard practice for the employment of structural steel in building, and expressed the hope that all bodies concerned would take steps to insure that the results of the work of the Steel Structures Research Committee were effectively applied. In addition to representatives of professional and trade organizations in the building industry, there were representatives from the Ministry of Health, the Home Office, Offices of the Dominions, the Colonial Office, London County Council and from 26 leading provincial municipalities.

German Motor Cars Compete with American

HAMBURG, GERMANY, Oct. 18.—The assembly plant in Berlin of the Chrysler Corp. has been closed, and there are reports that other American motor companies will follow, as a result of competition from German-made cars and the reduced buying of automobiles in Germany.

Japan Rolled 128,000 Tons of Rails in Six Months

YOKOHAMA, JAPAN, Oct. 3.—In the second half of its fiscal year, the Government Steel Works rolled about 128,000 metric tons of heavy rails, including about 60,000 tons for the Imperial Government Railways, 33,000 tons for the Sanki-Kai Railway, and 35,000 tons for railroads in Korea, Formosa, Manchuria and other Far Eastern markets.

American Steel & Wire Co. has placed with the E. W. Bliss Co., Salem, Ohio, an order for four four-high roll stands with 400 hp. gear reduction drives, and four four-high roll stands with 250 hp. gear reduction drives. These mills were purchased for installation at the Cuyahoga works, Cleveland.

Prices Weaker and Orders Scarce in Germany

(By Radiogram)

BERLIN, Nov. 3.

DOMESTIC and export markets have weakened further. Production of pig iron for the first nine months has been 23 per cent below that of 1929 and of steel, 26 per cent down.

The Steel Trust's annual report shows a decline in turnover of 14 per cent. Orders on the Trust's books are 56 per cent below the average for the preceding year.

The Government has instituted an inquiry to see whether the Iron and Steel Syndicate should reduce domestic prices, which are 65 per cent above the Western European level.

Export prices have dropped again, bars being £4 a ton (0.89c. a lb.) f.o.b.; joists (beams) of normal profile, £3 13s. (0.81c.); billets, £3 9s. ($17.76).

Only in steel rails is there an improvement, in consequence of the Government's program for creating employment.

There are new orders from Russia, of considerable size, for machine tools and equipment for blast furnaces and coke ovens.

Improvement in the steel market is expected, for stocks in dealers' and consumers' hands have fallen to a minimum.

Soviet Manganese Ore Sales Increasing

HAMBURG, GERMANY, Oct. 18.—Sales of manganese ore to European users by the Russian Manganese Ore Export Co., with main office in Berlin, have been greatly increased. In August Germany received 35,501 tons of Georgian ore, compared with 9,400 tons from all other sources. About 79 per cent of French requirements was Georgian ore, and it formed 81 per cent of Belgian, 86 per cent of Italian, 72 per cent of Czechoslovakian, and 83 per cent of Austrian requirements. Formerly Russia supplied 25 to 40 per cent of the needs of these markets.

Aroostook Road May Add Arbitraries on Steel

WASHINGTON, Nov. 4.—The Bangor & Aroostook Railroad was authorized by a decision of the Interstate Commerce Commission last week to add arbitraries for hauling iron and steel products over and above mileage rates prescribed in the so-called general iron and steel rate case. This proceeding covered Official Classification territory and set up a distance scale of rates for New England, which is 10 per cent above the scale of rates in the remainder of the territory.

In asking for modification of reports on the case, the Bangor & Aroostook pointed out that the territory it serves lies outside the so-called standard rate New England territory. The commission did not undertake to prescribe a definite basis for the arbitraries, but said the method of procedure for short and weak lines provided in the Eastern class rate case should be followed in the present instance.

New Japanese Steel Piling Patented

YOKOHAMA, JAPAN, Oct. 3.—The Seitetsu Jo (Government Steel Works) has been granted a patent on steel piling, following a delay occasioned by the protest of a foreign maker claiming infringement of patent rights. The necessary rolls are being made for the production of the new piling, which is expected to be begun some time this fall.

New York Steel Treaters to Discuss Carburizing

Three speakers will address the November meeting of the New York chapter of the American Society for Steel Treating, Monday, Nov. 10. The general topic will be "Carburizing," and it will be approached from three angles. "Carburizing with Gas" will be discussed by E. C. Cook, American Gas Furnace Co., Elizabeth, N. J., "Liquid Baths for Carburizing" will be presented by E. C. Moffett of the American Cyanamid Co., New York. "Solid Carburizing" will be the topic of Stanley P. Rockwell, president, Stanley P. Rockwell Co., Hartford, Conn. A discussion will follow. The meeting will be held in the assembly room of the Merchants Association, Woolworth Building, at 8 p. m. It will be preceded by a dinner at Trommer's Restaurant, 169 Greenwich Street, New York.

Half Our Industrial Market In 37 Counties of Country

Annual purchases of materials and supplies by the manufacturing industries of the United States, located in 3073 counties, represents a $35,000,000,000 market, says Dr. Frank M. Surface, assistant director of the Bureau of Foreign and Domestic Commerce. Of this total, half the consumption by manufacturers is limited to 37 counties, and more than 25 per cent of the consumption was by manufacturers in eight: Cook County, Ill., New York County, N. Y., Wayne County, Mich., Philadelphia County, Pa., Kings County, N. Y., St. Louis County, Mo., Cuyahoga County, Ohio, and Hudson County, N. J.

About 75 per cent of materials used by manufacturing establishments are purchased in 143 counties and 85 per cent of all purchases represent the requirements of 168 counties in the country.

Steel Exports in Sharp Drop, But Imports Show Increase

WASHINGTON, Oct. 30.—Exports of iron and steel products from the United States in September were only 131,211 gross tons—the lowest since February, 1925, when they totaled 101,665 tons. The decline from August was 20,024 tons.

In the first nine months exports were 1,639,219 tons, a reduction of 30 per cent from last year.

Imports in September amounted to 40,285 tons, an increase of 4898 tons over August. In the first nine months, 1930 imports were 396,194 tons, a decline of 33 per cent from 1929, at 586,582 tons.

Exports of scrap in September were the smallest for any month since January, 1927. Exports of pipe and fittings were the smallest in more than four years. Exports of rails were the smallest since last January. On the other hand, exports of structural steel were the largest since last March; tin plate, largest since last April; sheets of all kinds, largest since last May.

Canada, the leading market for American shipments, took 66,448 tons in September, or 50.6 per cent of the total. This was the largest movement to Canada since last May's 87,060 tons.

Imports of manganese ore were 21,571 tons, of which 10,009 tons came from Soviet Russia, 6192 tons from Brazil and 2747 tons from the Gold Coast of Africa.

Belgium led as the source of imports of iron and steel, supplying 13,015 tons.

Exports of Iron and Steel from the United States

(In Gross Tons)

	September		Nine Months Ended September	
	1930	1929	1930	1929
Pig iron	833	1,806	11,222	42,629
Ferromanganese	234	98	6,803	1,355
Scrap	7,663	32,803	319,446	397,096
Pig iron, ferroalloys and scrap	*8,730*	*34,707*	*337,471*	*441,080*
Ingots, blooms, billets, sheet bars	256	2,450	14,968	38,331
Skelp	12,959	12,136	85,750	94,869
Wire rods	1,288	2,247	32,584	34,099
Semi-finished steel	*14,503*	*16,833*	*133,302*	*167,299*
Steel bars	3,739	16,999	69,543	152,609
Alloy steel bars	487	395	5,698	12,790
Iron bars	171	192	1,512	4,231
Plates, iron and steel	5,938	12,868	82,247	153,763
Sheets, galvanized steel	5,059	13,218	70,030	122,341
Sheets, galvanized iron	428		5,139	
Sheets, black steel	10,339	11,822	91,638	141,554
Sheets, black iron	998	1,313	8,971	11,950
Hoops, bands, strip steel	2,609	4,509	33,450	56,997
Tin plate; terne plate	22,135	19,910	189,397	194,273
Structural shapes, plain material	12,128	21,187	113,520	217,694
Structural material, fabricated	10,214	10,170	82,457	87,745
Tanks, steel	1,095	....	13,660	....
Steel rails	6,526	10,070	87,870	115,387
Rail fastenings, switches, frogs, etc	1,236	1,704	15,840	24,703
Boiler tubes	1,158	1,761	12,188	14,484
Casing and oil-line pipe	2,952	6,540	52,112	93,668
Pipe, black and galvanized, welded steel	5,368	12,684	66,561	107,845
Pipe, black and galvanized, welded iron	714		12,599	
Plain wire	1,473	3,344	20,579	36,045
Barbed wire and woven wire fencing	3,566	5,548	31,877	50,932
Wire cloth and screening	122	156	1,362	1,331
Wire rope	453	437	3,773	5,670
Wire nails	870	813	6,346	10,180
Other nails and tacks	404	838	4,699	8,768
Bolts, nuts, rivets and washers, except track	659	1,483	8,263	12,431
Rolled and finished steel	*100,841*	*157,961*	*1,091,331*	*1,637,391*
Cast iron pipe and fittings	2,154	7,034	25,494	29,544
Malleable iron screwed fittings	720	784	8,543	9,043
Car wheels and axles	1,373	1,250	11,710	16,466
Iron castings	339	582	5,405	9,004
Steel castings	558	671	8,103	8,804
Forgings	296	518	6,942	9,986
Castings and forgings	*5,440*	*10,839*	*66,197*	*82,847*
All other	1,697	1,075	10,918	13,744
Total	131,211	221,415	1,639,219	2,342,361

Imports of Iron and Steel Products into the United States

(In Gross Tons)

	September		Nine Months Ended September	
	1930	1929	1930	1929
Pig iron	10,330	11,013	90,387	103,594
Sponge iron	1			
Ferromanganese and spiegeleisen*	2,265	2,795	40,170	60,856
Ferrochrome†	....	48	162	522
Ferrosilicon‡	4	966	3,890	7,306
Other ferroalloys	....	....	285	....
Scrap	2,233	6,399	19,473	70,806
Pig iron, ferroalloys and scrap	*14,833*	*21,221*	*154,367*	*243,084*
Steel ingots, blooms, billets, etc	3,218	2,360	15,297	20,901
Wire rods	400	1,401	6,899	12,608
Semi-finished steel	*3,618*	*3,761*	*22,196*	*33,509*
Concrete reinforcement bars	3,666	3,694	32,707	28,953
Hollow bar and drill steel	189			
Merchant steel bars	2,440			
Iron bars	65	161	868	2,446
Iron slabs	....			
Boiler and other plate	....	215	1,792	3,033
Sheets, skelp and saw plate	788	2,771	19,926	19,109
Tin plate	48	29	197	237
Structural shapes	6,537	15,525	100,355	118,640
Sheet piling	....			
Rails and rail fastenings	2,223	258	7,214	5,902
Welded pipe	654	2,470	16,212	30,584
Other pipe	640			
Barbed wire	263	217	3,457	4,486
Round iron and steel wire	225	551	3,639	4,629
Telegraph and telephone wire	6	11	49	14
Flat wire and strip steel	100	199	952	1,663
Wire rope and strand	122	93	1,890	1,779
Other wire	51	17	291	402
Hoops and bands	2,916	5,580	16,343	34,337
Nails, tacks and staples	418	857	3,982	7,394
Bolts, nuts and rivets	33	47	289	274
Horse and mule shoes	....	....	10	25
Rolled and finished steel	*21,384*	*32,695*	*210,173*	*263,907*
Cast iron pipe and fittings	373	3,478	8,293	44,532
Castings and forgings	77	90	1,165	1,550
Total	40,285	61,245	396,194	586,582
Manganese ore*	21,571	13,123	223,671	260,168
Iron ore	215,493	246,917	2,338,809	2,314,124
Magnesite (dead-burned)	5,302	12,292	34,074	31,915

*Manganese content only.
†Chromium content only.
‡Silicon content only.

Where Steel Exports Went in First Nine Months

Canada Took 327,678 Tons of Nine Leading Items — Japan Retains Second Position with 64,061 Tons, Followed by Chile, 38,979 Tons; Argentina, 27,912 Tons; Mexico, 25,450 Tons; Philippines, 22,920 Tons

Exports from United States, by Countries of Destination

(In Gross Tons)

Steel Plates

	September		Nine Months Ended September	
	1930	1929	1930	1929
Totals	*5,938*	*12,868*	*82,247*	*153,763*
Canada	4,876	10,589	64,901	91,730
Japan	25	151	1,023	2,625
Cuba	89	52	1,403	947
Philippine Islands	320	95	1,245	1,455
Mexico	19	27	1,023	370
Argentina	....	....	....	....
Chile	....	....	....	....
Colombia	....	....	....	....

Galvanized Sheets

	September		Nine Months Ended September	
	1930	1929	1930	1929
Totals	*5,487*	*13,218*	*75,169*	*122,341*
Canada	905	1,611	16,472	26,282
Japan	46	316	2,038	2,434
Cuba	289	712	3,713	4,603
Philippine Islands	783	2,748	14,361	21,024
Mexico	386	2,180	3,992	10,704
Argentina	182	453	1,604	4,874
Chile	....	....	820	....
Colombia	203	291	2,140	4,082

Black Steel Sheets

	September		Nine Months Ended September	
	1930	1929	1930	1929
Totals	*10,339*	*11,822*	*91,638*	*141,553*
Canada	8,857	5,391	57,679	74,165
Japan	320	1,556	7,259	20,588
Cuba	74	122	633	1,082
Philippine Islands	54	20	2,537	2,483
Mexico	58	171	2,287	2,447
Argentina	593	754	3,460	5,041
Chile	....	8	....	3,437
Colombia	10	25	446	368

Steel Rails

	September		Nine Months Ended September	
	1930	1929	1930	1929
Totals	*6,526*	*10,070*	*87,870*	*115,387*
Canada	1,878	1,842	12,694	20,141
Japan	....	2,117	5,137	9,134
Cuba	698	686	5,201	6,504
Philippine Islands	2	97	5,671	7,665
Mexico	252	710	775	5,672
Argentina	52	....	2,150	3,740
Chile	....	110	27,500	15,625
Colombia	....	96	3,223	4,043
Brazil	....	1,623	4,212	9,174
China	....	....	45	4,151

Barbed Wire

	September		Nine Months Ended September	
	1930	1929	1930	1929
Totals	*3,566*	*5,548*	*31,877*	*50,932*
Canada	64	245	2,381	2,070
Japan	....	....	....	....
Cuba	165	602	2,252	2,493
Philippine Islands	36	834	802	5,198
Mexico	345	639	4,822	5,223
Argentina	549	745	4,042	5,995
Chile	....	....	....	....
Colombia	74	210	1,229	4,840
Brazil	....	664	5,084	....
China	....	....	....	....

Plain and Galvanized Wire

	September		Nine Months Ended September	
	1930	1929	1930	1929
Totals	*1,473*	*3,344*	*20,579*	*36,045*
Canada	269	390	5,570	10,030
Japan	3	91	375	1,097
Cuba	157	96	978	900
Philippine Islands	12	26	304	545
Mexico	80	149	1,395	1,809
Argentina	272	815	4,570	6,125
Chile	16	96	132	882
Colombia	....	....	....	....
Brazil	95	153	741	1,068
China	....	....	....	....

Tin Plate

	September		Nine Months Ended September	
	1930	1929	1930	1929
Totals	*22,135*	*19,916*	*189,397*	*194,278*
Canada	11,981	4,337	48,776	36,468
Japan	5,075	2,566	42,464	45,254
Cuba	587	225	3,389	4,329
Mexico	836	859	9,075	6,880
Argentina	1,627	1,593	10,192	13,728
Chile	784	220	4,005	3,531
Brazil	306	176	2,090	10,777
China	972	4,537	18,050	21,805
India	....	347	7,957	4,061
United Kingdom	....	....	....	....
Italy	....	205	7,513	5,149

Steel Bars

	September		Nine Months Ended September	
	1930	1929	1930	1929
Totals	*4,226*	*17,894*	*75,241*	*165,899*
Canada	1,736	6,350	32,398	78,892
Japan	4	3,450	2,055	25,633
Cuba	156	294	1,677	3,497
Mexico	87	219	905	1,183
Argentina	13	....	466	....
Chile	....	....	4,827	2,134
Brazil	66	116	582	2,040
China	....	....	....	....
India	....	....	....	....
United Kingdom	619	3,029	7,467	18,777
Italy	....	....	....	....

Plain Heavy Structural Material

	September		Nine Months Ended September	
	1930	1929	1930	1929
Totals	*12,128*	*21,187*	*113,520*	*217,694*
Canada	10,706	17,294	86,807	172,681
Japan	....	1,904	3,710	8,889
Cuba	38	142	2,080	1,928
Mexico	121	135	1,176	739
Argentina	2	28	1,427	1,889
Chile	....	....	1,695	3,201
Brazil	....	....	....	....
China	....	....	....	....
India	....	....	....	....
United Kingdom	....	....	....	....
Italy	....	....	....	....

Destination of Iron and Steel Exports

(In Gross Tons)

Country	September, 1930	August, 1930	September, 1929	January Through September 1930	January Through September 1929
North and Central America and West Indies	*81,549*	*74,118*	*111,198*	*816,441*	*1,190,865*
Canada and Newfoundland	67,426	59,882	88,107	663,374	985,213
Cuba	3,559	4,545	5,704	35,645	52,091
Guatemala	248	301	481	2,976	5,693
Honduras	394	377	364	5,212	8,020
Mexico	5,259	4,464	8,922	68,670	75,018
Panama	998	2,088	2,864	14,836	15,737
Salvador	101	131	127	1,480	5,454
British West Indies	798	1,102	1,288	10,745	15,011
Other West Indies	1,919	842	2,703	9,973	21,308
Other Central America	847	386	638	3,530	7,320
South America	*16,541*	*30,654*	*27,446*	*228,120*	*297,884*
Argentina	4,990	2,069	6,145	42,322	71,748
Brazil	2,950	1,775	6,240	32,916	52,655
Chile	2,775	16,910	2,898	65,326	44,233
Colombia	1,095	1,660	2,424	20,709	33,399
Peru	1,423	1,990	6,949	14,182	29,955
Uruguay	1,251	1,889	372	16,286	6,560
Venezuela	1,652	3,016	2,042	31,277	54,924
Other South America	405	1,345	376	5,092	4,410
Europe	*5,969*	*9,263*	*25,332*	*144,701*	*297,364*
France	281	82	1,054	5,054	15,823
Germany	189	105	246	4,631	18,096
Italy	543	415	7,888	43,575	95,817
Poland and Danzig	....	1	3,002	5,120	75,081
Soviet Russia	264	387	2,249	7,803	8,399
Spain	33	124	71	11,069	9,414
Sweden	95	388	140	3,195	2,445
United Kingdom	3,083	4,370	7,825	35,971	50,852
Other Europe	1,481	3,391	2,857	28,283	21,437
Far East	*25,570*	*34,820*	*55,256*	*433,007*	*539,130*
British Malaya	293	534	490	5,307	6,205
China	1,927	1,883	6,356	32,218	57,909
Dutch E. Indies	2,804	3,728	3,544	32,098	51,333
India and Ceylon	1,211	4,420	1,004	17,352	15,609
Hong Kong	381	124	631	4,759	5,213
Japan	11,127	14,920	28,319	256,650	287,014
Kwantung	2,573	165	566	9,403	9,282
Philippines	4,333	7,562	11,622	54,656	77,787
Australia	514	737	1,348	8,384	17,404
New Zealand	115	187	735	2,778	3,689
Other Asia and Far East	292	560	641	9,402	7,685
Africa	*1,582*	*2,380*	*2,183*	*16,950*	*17,118*
Union of South Africa	795	589	813	4,246	6,760
Egypt	180	32	444	3,573	6,288
Mozambique	406	1,432	892	4,194	2,656
Other Africa	201	327	34	4,937	1,414
Totals	131,211	151,235	221,415	1,639,219	2,342,361

Iron and Steel Used in a Modern Brass and Copper Mill

(*Continued from page* 1286)

can be mentioned here. These are the rate of heat conductivity of the tool or roll, tendency to pick up the metal or its scale, coefficient of friction between the work and the steel, the type of heat treatment that is to be used for the tool—whether high or low temperature treatment which has an economic meaning —to be air cooled or oil quenched which influences the dimensional changes of the tool after hardening, etc. Some of the steels used and intended for hot work appreciably vary in these respects and present problems which are, by no means, unimportant.

From the standpoint of chemical composition there seems to be no one type of steel as being best suited for all hot working operations of a brass and copper mill. Each case has to be considered individually, the specific requirement should be clearly defined and then the steel which appears to have the necessary properties should be selected.

Hot working steels used at present can be classified as follows:

1—Those containing carbon and chromium.
2—Carbon, chromium and tungsten.
3—Carbon, chromium, tungsten and vanadium.
4—Carbon, chromium, tungsten, vanadium and nickel.
5—Carbon, chromium and molybdenum.

Hot Piercing and Forging Steels

AMONG the steels used for this operation can be mentioned straight carbon steel having a carbon content of 0.50 to 0.60 per cent; carbon-chromium steel, having about 0.12 per cent carbon and about 12 per cent chromium; low-tungsten type high-speed steel with low carbon, and a chromium steel with 1 per cent carbon and about 4 per cent chromium, all of

Machinery Exports and Imports Go Lower

WASHINGTON, Oct. 30.—Continuing their downward movement, exports of machinery in September were valued at $33,828,756, the smallest in just two years, and comparing with $34,294,398 in August. In the first nine months of 1930 foreign shipments of machinery were valued at $420,012,583, comparing with $461,355,985 in the corresponding period of last year.

Imports of machinery as listed in THE IRON AGE table were valued at $1,252,860 in September, a slight drop under those in August, at $1,326,528.

Exports of machinery and vehicles in September were valued at $52,283,939, against $85,300,240 in September, 1929. In the first nine months of 1930, they were valued at $682,571,552, a drop of 28½ per cent from 1929, with a value of $955,077,683.

September automobile exports were $18,455,183, virtually 50 per cent under September, 1929, at $36,588,410. In the first nine months, 1930 exports of automobiles and other vehicles were valued at $262,558,969, a decline of 47 per cent from last year, when the value was $493,721,698.

Machinery Exports from the United States
(By Value in Thousands of Dollars)

	September		Nine Months Ended September	
	1930	1929	1930	1929
Locomotives	$10	$470	$595	$3,032
Other steam engines	47	55	504	598
Boilers	99	150	1,107	1,463
Accessories and parts	59	60	724	710
Automobile engines	160	625	3,907	9,461
Other internal combustion engines	436	1,021	6,770	7,723
Accessories and parts	261	274	2,770	3,377
Electric locomotives	129	42	791	508
Other electric machinery and apparatus	875	1,148	8,053	10,028
Excavating machinery	478	538	7,821	6,335
Concrete Mixers	51	151	724	1,154
Road-making machinery	103	201	2,826	2,431
Elevators and elevator machinery	262	623	4,016	4,070
Mining and quarrying machinery	920	1,809	12,305	13,459
Oil-well machinery	1,718	1,878	20,809	18,882
Pumps	768	835	7,332	8,798
Bending and power presses	231	272	3,332	2,610
Forging machines	169	86	1,641	1,113
Machine tools	1,839	2,341	19,870	21,336
Other metal-working machinery and parts	574	592	5,214	5,696
Textile machinery	649	1,035	6,769	9,915
Sewing machines	432	951	5,550	7,918
Shoe machinery	152	147	1,336	1,503
Flour-mill and gristmill machinery	104	120	344	500
Sugar-mill machinery	389	770	3,390	3,194
Paper and pulp-mill machinery	326	394	2,668	2,941
Sawmill machinery	36	72	585	68
Other woodworking machinery	180	192	1,415	1,785
Refrigerating and ice-making machinery	389	1,000	3,171	11,578
Air compressors	293	646	4,662	5,870
Typewriters	1,188	1,649	13,235	17,894
Power laundry machinery	70	73	1,111	1,505
Typesetting machines	316	588	2,988	4,547
Printing presses	506	369	4,185	5,163
Agricultural machinery and implements	5,014	16,554	97,276	161,151
All other machinery and parts	14,596	10,981	160,217	103,039
Total	$33,829	$48,712	$420,013	$461,356

Imports of Machinery into the United States
(By Value)

	September		Nine Months Ended September	
	1930	1929	1930	1929
Metal-working machine tools	$83,826	$95,200	$800,188	$904,410
Agricultural machinery and implements	242,530	502,507	7,870,497	7,460,388
Electrical machinery and apparatus	310,571	232,302	2,008,462	2,131,267
Other power-generating machinery	26,302	87,063	455,822	957,061
Other machinery	441,567	829,301	6,679,865	9,059,672
Vehicles except agricultural	148,064	392,535	2,011,361	4,260,727
Total	$1,252,860	$2,138,908	$19,826,195	$24,773,525

which, if properly heat treated, seem to be quite well suited to hot piercing machine parts subject to heat.

Some of the steels used for hot forging brass and copper are:

1—Carbon, 1 per cent; chromium, 4 per cent.
2—Carbon, 0.30 to 0.40 per cent; chromium, 8 per cent; tungsten, 8 per cent.
3—Carbon, 0.30 per cent; chromium, 3 per cent; tungsten, 10 per cent; vanadium, 0.30 per cent.
4—Carbon, 0.40 to 0.50 per cent; tungsten, 13 to 14 per cent; chromium, 3.50 per cent; vanadium, 0.50 per cent.

Steels for Extrusion Dies

AMONG the steels used for dies in the extrusion of brass and copper which have given satisfactory service in varying degrees can be mentioned the following:

1—Carbon, 0.30 to 0.40 per cent; tungsten, 9 to 10 per cent; chromium, 3 to 3.50 per cent; vanadium, 0.30 to 0.40 per cent.
2—Carbon, 0.50 to 0.60 per cent; chromium, tungsten and vanadium same as in high-tungsten type high-speed steel.
3—Carbon, 0.50 to 0.60 per cent; chromium, tungsten and vanadium same as in low-tungsten type high-speed steel.
4—Carbon, 0.50 to 0.60 per cent; chromium, tungsten and vanadium same as in high-tungsten type high-speed steel with the addition of 7 to 8 per cent cobalt.

Of the four types of steel just mentioned, types Nos. 2 and 3 are most generally used. Like many other applications of steel in tools, here too the kind of heat treatment is of much importance.

Steels used for what might be termed the secondary members of an extrusion press are those that go into the containers, liners and rams among which the member of greatest importance, as far as the problem of selecting steel is concerned, is the liner or the hollow cylinder which holds the hot billet to be extruded.

There has been a gradual progress in the type of steel used for these liners. As these liners are subject to internal pressures as high as 80,000 lb. per sq. in. at temperatures running well above 1200 deg. Fahr., they must have quite high physical properties as well as heat resisting characteristics. The steels that have been used for liners are as follows:

1—Chromium-nickel steels, carbon, 0.50 to 0.55 per cent; nickel, 3.25 to 3.50 per cent; chromium, 1.50 to 1.75 per cent.
2—Chromium-vanadium steel, carbon, 0.60 to 0.65 per cent; chromium, 1.75 to 2 per cent; vanadium, 0.25 to 0.30 per cent.
3—Chromium-molybdenum steel, carbon, 0.60 to 0.70 per cent; chromium, 1.75 to 2 per cent; molybdenum, 0.30 to 0.40 per cent.
4—Hot work steel, carbon, about 0.30 per cent; chromium, about 3 per cent; tungsten, about 9 per cent; vanadium, about 0.30 per cent.
5—Chromium-tungsten steel.

In the fabrication of various articles from brass and copper, the kind of steel that is to be used for different operations, such as blanking, deep drawing, forming, cold stamping, clipping, knurling, etc., need not be considered as being especially different from the steel to be used on similar operations in fabricating iron and steel articles. With very few exceptions, any steel that would make a satisfactory tool for the latter should also be satisfactory for the former. One of these exceptions is in the case of turning brass, where a better and smoother finish can be obtained by plain carbon or by so-called fast-finishing tool steels than is possible with regular high-speed steel.

High-Speed Steel Treated in a Special Electric Furnace

(*Concluded from page* 1298)

From the quenching tank the parts are transferred to a hot cleansing solution and thoroughly washed. They are then placed in the Homo tempering furnace and kept at a temperature of from 1050 to 1100 deg. Fahr. for at least 3 hr., the actual temperature depending upon the nature of the work. Following this the parts are cooled in air and sand blasted and are then ready for rough grinding and hardness testing.

Very Uniformly Heat Treated Products Obtained

It will be noticed that the preheating furnace is quite small as compared to the large high heat furnace. As previously mentioned, use was made of a preheating furnace already on hand and, so far, our production has not made necessary the installation of a larger furnace.

This equipment as described is producing a very uniformly heat-treated product. These parts are tested 100 per cent for hardness with the Rockwell hardness tester and are maintained within close hardness limits. Daily microscopic examination is also used as a further check on the uniformity of material and heat treatment.

British Standard Keys and Keyways

(*Concluded from page* 1305)

cornered or rounded. From the small-scale section, showing a rectangular key, it would appear that it was the former. The shaft was 2½ in. in diameter and tests were taken on keys ⅝ in. square and ⅝ in. x 7/16 in. respectively. The length of key scales approximately 4⅝ in. in the shaft, 4¼ in. in the hub. It is stated that in the earlier tests distortion was inappreciable below a torque of 45,000 lb.-in., and that the apparatus would permit up to 65,000 lb.-in. The tests made years later were in torque steps of 5000 lb.-in. to a limit of 20,000 lb.-in.

This table may be found useful for purposes of comparison. It gives approximate results as calculated for torques of 20,000 and 45,000 lb.-in. respectively, on the assumptions named. Even so, shear and crushing values should be within 10 per cent of the correct figures. Key crushing intensities are much in excess of the values for torsional stresses in the shaft, particularly where the rectangular key is concerned. Remembering that the deepening of the keyway materially reduces the torsional strength of the shaft, deductions from the data, while doubtless not

conclusive, would seem to lend point to the view that it is unwise to minimize crushing pressures in keys and keyways at the expense of the shaft.

The shaft stresses shown in brackets indicate what would obtain if there were no keyway cut in the shaft.

Crankshafts for New Reo Cars

(*Concluded from page* 1294)

After the valves are assembled, the motor is turned over by a special device and goes through another washing machine. At the end of the machine is a mechanical unit which lifts the motor a few feet and allows the washing fluid to drain. The flywheel housing is added as the motor moves further along the line. The transmission face of the flywheel housing is milled, the motor being lowered on to the miller by means of a special air fixture.

Assembly of the camshaft and bearing shells follows. The motor then passes to a power press, where the gear is pressed on to the crank. The crankshaft and flywheel are put in position. Following this is a number of assemblies, including the oil pump, oil pans, timing chain, gear cover, generators, valve-guide lifter, oil breather, head studs, cylinder head wires, distributer valve covers, water plate and the manifold. The addition of the water pump, fan belt and starter is the concluding operation.

The motor is hooked on to a chain hoist running on an overhead monorail and transported from the end of the assembly line to the dynamometer room, where it is subjected to a 3½-hr. test before going to the final assembly department.

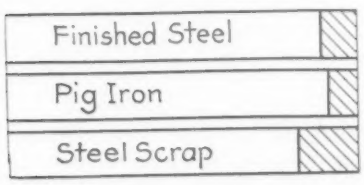
Liquidation of Commodity Prices

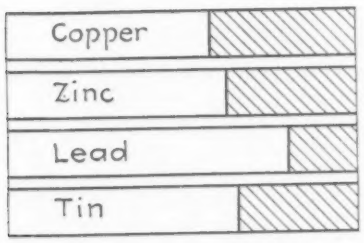
WHOLESALE prices of 29 commodities, showing the amount of liquidation between September monthly averages in 1929 and in 1930, are given in the table. The diagram shows the same thing graphically, and indicates the relative extent to which prices have receded among the different groups. These figures all came from a study made by Harvard Economic Society.

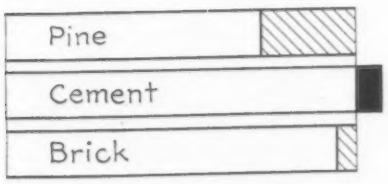
Taking the groups as split up, both in the table and in the diagram, it will be noted that the non-ferrous metals, the textiles and the rubber and leather group have receded most of all. The average declines for these three groups run above 30 per cent—textiles showing 30.2 per cent; non-ferrous metals, 33.5 per cent; and the rubber and leather group, 36.6 per cent.

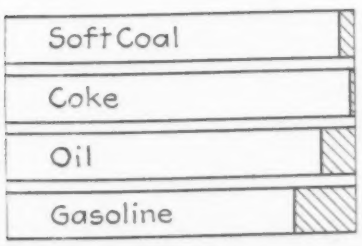
In the next category come the iron and steel and the foods. Iron and steel have shown an average drop of 12.2 per cent, whereas foods have gone down 19.5 per cent.

Most resistant of all have been the building materials and the fuels, each of which has gone down about 8.9 per cent, on the average. Only one of the entire list of 29 items has shown an increase. This was cement, which went up 7.1 per cent.





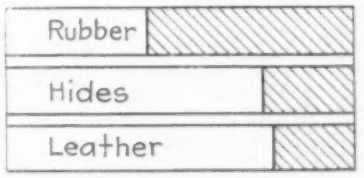


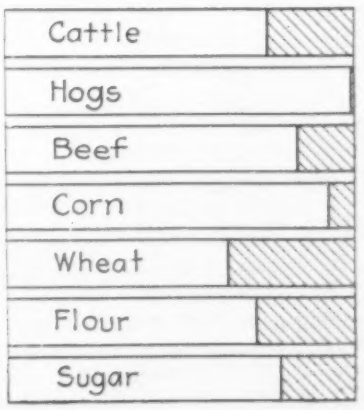


Item	September Average 1930	1929	Decline, Per Cent
Finished steel(a)	2.146c.	2.394c.	10.4
Pig iron(a)	$16.70	$18.27	8.6
Steel scrap(a)	13.70	16.60	17.5
Copper, electrolytic	10.31c.	17.78c.	42.0
Zinc, St. Louis	4.27	6.80	37.2
Lead, St. Louis	5.35	6.69	20.0
Tin, New York	29.65	45.36	34.6
Southern pine, M	$16.62	$22.99	27.7
Brick, common(b)	12.76	13.57	6.0
Portland cement	1.50	1.40	*7.1
Bituminous coal	1.75	1.83	4.4
Coke, furnace	2.60	2.65	1.9
Petroleum, bbl	1.27	1.42	10.6
Gasoline, gal	6.29c.	7.71c.	18.4
Raw cotton, lb	10.96	18.85	41.9
Cotton goods	9.94	12.87	22.8
Wool	64.5	89.1	27.6
Worsted yarn	143.5	164.0	12.5
Raw silk, lb	$2.84	$5.28	46.2
Hides, lb	14.25c.	19.50c.	26.9
Sole leather, lb	43.0	56.5	23.9
Crude rubber, lb	8.11	19.78	59.0
Cattle, lb	10.29	13.75	25.2
Hogs, lb	10.64	10.69	0.5
Beef, Chicago, lb	19.56	23.45	16.6
Corn, bu.	93.2	101.0	7.7
Wheat, bu	79.0	124.6	36.6
Wheat flour, bbl	$4.94	$6.89	28.3
Raw sugar, lb	3.14c.	4.00c.	21.5

(a)THE IRON AGE composite prices.
(b)Average of 92 yards. "Distress" brick were reported around New York in September at $7 or less.
*Increase.

PRICE declines in one year are shown in the diagrams. Only one of 29 items—cement—made a gain, but hogs and coke showed great resistance to the pressure.





Business as Others See It

Digest of Current Financial and Economic Opinion

A SWELLING of loanable funds, which has been proceeding for more than a year, is believed by Alexander Hamilton Institute to foretell a definite rise, of some magnitude, in general business operations. While "no period may be taken as representing the exact lag between changes in the supply of loanable funds and major turns in the course of business, examination of past years will show approximately a one-year period as average." This turning point "may be near at hand or may be delayed until well into 1931."

There is much confusion as to present trends in many lines. Something depends upon whether weekly or monthly figures are used as the basis. Some lines are reported to be showing gains greater than seasonal—textile, for instance. Building is gaining in some of its branches and lagging in others. Department store sales are moving upward, stimulated, in some cases, by more intensive advertising. But merchants, in particular those dealing with high-priced goods, are not looking for an unusually heavy holiday trade.

Not even up to seasonal expectations is the characterization one authority puts upon activity in October. If the car-loadings declines of the two latest reported weeks are representative, thinks *Annalist*, "the decline has begun about five weeks earlier than in the preceding five years; but it is possibly not safe to be sure of such an inference." This publication reports that its index of wholesale prices has reached a condition of virtual stability, having been between 121 and 122 for four weeks.

As soon as we get politics behind us, says *Commerce and Finance*, things will be better. "There is always a let-down in business as election day approaches." A writer in that paper thinks that "far too much attention has been and is being paid to the future of business and far too little to the present. Operating statements reflect this vividly. Maladjustment to current conditions is everywhere evident and to it may be traced the present unsatisfactory state of profits and the continued mental depression of business men. . . .

"It matters little to the individual right now whether business picks up next month or next spring. That is nothing to worry about and, besides, nobody knows when it will pick up. The first step is to refrain from banking on probabilities and accept things as they are."

Inflexible Wage Rates Attacked Again

Commercial and Financial Chronicle lays stress once more on swollen wage rates of a few favored labor groups, arguing for "a spirit of *mutual* concession and sacrifice. . . . It is quite possible that lower wages, when the cost of living is being simultaneously reduced, might not involve lowering of American standards of living in the slightest degree. . . .

"At the moment, the greatest obstacle in the path of business recovery is the relentless opposition manifested to wage concessions on the part of labor, even where imperatively called for by the requirements of the situation."

Business activity failed to make the usual October gain, says Harvard Economic Society, and thus "the month which marks the peak of the autumn trade movement continued in the declining phase of the cycle."

Steel Constructors Look for Price Stabilization

(*Continued from page* 1320)

velop into large consumers, and also his announcement at that time about maintaining wages, although "that statement is being quoted today as something that has just come off the rolls."

He took occasion also to suggest that if credits comparable to those allowed to Russian buyers were available to American companies, it might be helpful. Meanwhile through our credit extensions, the Soviet Government is building steel plants of a combined capacity of 20,000,000 tons per annum.

Takes Constructive Moves

The concluding session of the convention devoted itself in large part to the need of price stiffness, of a one price policy, of refusing to be a party to a practice of general contractors shopping around for revised prices, for more attention to salesmanship now that so much progress has been made in manufacturing economies, of depending generally on the institute's contract form and observing its code of practice, of withdrawing prices if it is learned no use is to be made of them, and so on.

The meeting voted the appointment of a committee to further a uniform building lien law among the States. It asked the board of directors to consider arranging a competition and prize awards for house designs incorporating steel construction. It endorsed a separation of steel work from the general contract, as exists in some States for the heating, plumbing and electrical work. It favored independence of bridge work in highway contracts and authorized the drawing up of specifications for highway bridges.

It was decided to hold the next annual meeting at White Sulphur Springs, W. Va. A committee was authorized to consider a celebration of the 50th anniversary of the erection in Chicago of the Home Life Insurance Building in 1884.

An imposing array of addresses included the following: R. I. Ingalls, president, Ingalls Iron Works Co., Birmingham, on future possibilities; J. C. Shryock, chief engineer, Belmont Iron Works, Philadelphia, on public opinion; T. W. Dodd, president, St. Joseph Structural Steel Co., St. Joseph, Mo., showing poor economies in highway bridge design; P. H. Wood, vice-president, Converse Bridge & Steel Co., Chattanooga, on beauty in highway spans; P. J. Freeman, chief engineer, Bureau of Tests and Specifications, Department of Public Works, Pittsburgh; Edward W. Stearns, assistant chief engineer, Port of New York Authority, on the construction of the Hudson River Bridge; George E. J. Pistor, Hay Foundry & Iron Works, New York, on European conditions; Otto von Halem, director of the German Steel Institute's office for the extension of the use of steel; E. W. Burgess, A. O. Smith Corpn., Milwaukee, who described the research building of the company, illustrated in THE IRON AGE of Oct. 23; Eugene P. Thomas, vice-president of the United States Steel Corpn., who spoke at the banquet, and Charles O. Hadly, secretary, Trade Research Bureau of the Steel Corpn., at Pittsburgh, who discussed in general terms the scope of cooperative research.

The early part of the meeting was reported on in last week's issue, page 1265.

This Issue in Brief

Saves labor costs by moving machines into groups for special work. Stamping company gets rid of many helpers by spotting presses where needed. — Page 1365.

* * *

Welded-on overlays as a surface preparation for machine parts makes possible substantial economy, says manufacturer. This is done by the autogenous fusion welded process, to reduce obsolescence of a machine or machinery parts.—Page 1370.

* * *

Lining up stamping equipment to speed output involves moving machines from place to place. This has been found to pay well in plant making steel stampings. —Page 1367.

* * *

Inspection of screw threads by optical measuring instruments is a practical shop procedure. This is being used in production work. —Page 1370.

* * *

Five factors determine maximum production of cold-heading die. These are the steel, design and heat treatment of die, material of bolt and operation of machine, says metallurgist. — Page 1368.

* * *

Welding of rustless steel is complicated by its high expansion coefficient, low thermal coefficient and high electrical resistance. But with careful welding technique and suitable fluxes it can be done.—Page 1376.

* * *

Higher carbon content materially decreases life of cold-heading dies, says expert. This is because of the effect of carbon on the flow and the hardness after cold working.—Page 1369.

Two methods of determining internal stresses in hollow cylinders are described by steel treater. One is submerged flushing and the other flushing at the holes, when quenching. The stresses vary considerably between these methods.—Page 1379.

* * *

Gases may be mixed to obtain any desired fuel for metallurgical purposes. Heating value, luminosity and other properties can be determined in advance.—Page 1375.

* * *

Tangential compression in cylinders quenched by flushing at the bore increases with quenching temperature, metallurgist finds. When the cylinders are quenched by complete submersion, however, the tangential tension decreases with increase of quenching temperature. — Page 1380.

* * *

Tungsten carbide differs from its predecessor, high-speed steel, in that it is the first product of a new metallurgy. High-speed steel was made by well recognized methods and did not require so much experiment and exploration.—Page 1383.

* * *

No satisfactory method of determining accurately the hardness of cemented tungsten carbide exists, says metallurgist. It is held that the use of a Rockwell tester is misleading, as it covers in part the strength of the bond. —Page 1382.

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NEXT WEEK

Seventy-fifth Anniversary Number of The Iron Age.

Much that is new is being learned about cemented tungsten carbide. Development of different grades to meet individual requirements of its diversified application is the prospect of the near future, according to metallurgist.—Page 1381.

* * *

Chromium-plated fittings in a power plant reduce labor of upkeep and add beauty. The material is not so hard to keep clean as the displaced brass work.— Page 1389.

* * *

Four major factors govern successful die-casting. These include alloy composition, rate of cooling, design of die, and the casting machine.—Page 1386.

* * *

One-quarter of the German population draws pay from the Government. Germany is held by observer to be the most advanced socialistic country in the world.— Page 1384.

* * *

Practical limit of injection pressure in die-casting appears to be about 500 lb. and many machines are operating at much less. Plunger-type machines, however, have been built for as high as 5000 lb.—Page 1387.

* * *

After it was decreed that all receiving doles must do public labor, 28 per cent in one German city voluntarily withdrew from the dole, 22 per cent claimed sickness—mostly falsely—and the total number of "unemployed" was reduced by 45 per cent.— Page 1385.

* * *

Blowholes and other imperfections in die castings depend largely upon accurate gating in the dies. A long, thin gate is preferable usually to a short, wide one.—Page 1388.

Rocker-arm of "Wasp" and "Hornet"

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